Vol. 8, No. 10
May 31, 1983

Energy Research Abstracts

Abstracts 22898-25288

Technical Information Center
UNITED STATES DEPARTMENT OF ENERGY

CURRENT AWARENESS PUBLICATIONS ON ENERGY

To provide complete coverage of literature related to major Department programs, announcement publications that are comprehensive in their coverage of certain energy fields are issued regularly. All information in these publications, plus additional backup information, is included in the Energy Data Base of the Technical Information Center; all references are also available for machine searching via the on-line retrieval system, DOE/RECON, and the commercial on-line retrieval systems. Descriptions of these current awareness publications, which are supported either directly or indirectly by the DOE, appear below. Department of Energy components may receive the listed publications free from the Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830, Telephone (615) 576-1303; (FTS) 626-1303.

PUBLICATIONS OF THE TECHNICAL INFORMATION CENTER

Energy Abstracts for Policy Analysis (EAPA)

A monthly abstract journal devoted to the analysis of energy research, conservation, and policy. Scope and coverage are limited to substantive articles or reports and emphasize the following: programmatic efforts; legislative, regulatory, and other legal aspects; social, economic, and environmental impacts; regional and sectoral analyses; institutional factors, etc. *EAPA* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402; domestic subscribers $6.00, foreign $7.50 per copy; annual cumulative index, domestic $10.00, foreign $12.50 per copy. The annual subscription price is $70.00 for domestic subscribers and $87.50 for foreign subscribers.

Energy Research Abstracts (ERA)

A comprehensive semimonthly abstract journal devoted to all areas of energy-related information produced by the Department of Energy, other U. S. government organizations, and foreign governments. *ERA* is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues is $165.00 for domestic subscribers and $206.25 for foreign subscribers. A single issue costs $9.50 (domestic) or $11.90 (foreign).

The following publications are available to the public on a subscription basis from the National Technical Information Service (NTIS), Springfield, Virginia 22161. The annual subscription rate for one volume (calendar) year (12 issues plus cumulative index) is $75.00 for domestic subscribers and $150.00 for subscribers outside the North American continent, except as listed below for *DOE Patents Available for Licensing (PAL)*. A single issue is $7.00 (domestic) and $14.00 (outside the North American continent).

Current Energy Patents (CEP)

A monthly publication providing abstracting and indexing coverage of the international patent literature, including patent applications, that concerns any aspect of energy production, conservation, and utilization. Available as PB83-902800.

DOE Patents Available for Licensing (PAL)

DOE is prepared to grant exclusive or nonexclusive, revocable licenses under DOE-owned U. S. patents and patent applications; this semiannual publication provides abstracting and indexing coverage to this literature. Available as PB83-946800; the annual subscription price is $14.00 (domestic) and $28.00 (foreign).

Energy and the Environment (EAE)

A monthly abstract journal devoted to information on the impacts of energy-related activities and radioactive and nonradioactive pollutants on the environment. Available as PB83-914900.

Fossil Energy Update (FEU)

A monthly abstract journal devoted to information on the processing and use of fossil fuels. Available as PB83-914600.

Fusion Energy Update (CFU)

A monthly abstract journal devoted to information on controlled thermonuclear research. Available as PB83-915300.

Solar Energy Update (SEU)

A monthly abstract journal devoted to information on the utilization of solar energy, including biomass and tidal and wind power. Available as PB83-914500.

The following publications are available from the National Technical Information Service (NTIS), Springfield, Virginia 22161. The annual rate for one volume (calendar) year (24 issues) is $40.00 for domestic subscribers and $80.00 for subscribers outside the North American continent.

Direct Energy Conversion (DEC)

A semimonthly current awareness bulletin covering the following areas: photovoltaics, magnetohydrodynamics, electrohydrodynamics, thermoelectrics, thermionics, and fuel cells. Available as PB83-946600.

Geothermal Energy Technology (GET)

A semimonthly current awareness bulletin devoted to information on the exploration and development of geothermal resources. Available as PB83-914700.

Nuclear Fuel Cycle (NFC)

A semimonthly current awareness bulletin covering all aspects of the nuclear fuel cycle, both front end and back end. Available as PB83-913400.

Nuclear Reactor Safety (NRS)

A semimonthly current awareness bulletin covering the following safety aspects: accident analysis, safety systems, radiation protection, decommissioning and dismantling, and security measures. Available as PB83-913500.

Radioactive Waste Management (RWM)

A semimonthly current awareness bulletin covering the following management aspects: transport and storage, waste processing, waste disposal, waste storage, radioactive effluents, and shipping containers. Available as PB83-902900.

INTERNATIONAL ENERGY PUBLICATIONS

The Technical Information Center cooperates with the following organizations in the publication of international abstract journals: (1) International Atomic Energy Agency, International Nuclear Information System, Vienna, Austria, for *Atomindex;* (2) International Energy Agency, IEA Coal Research, London, England, for *Coal Abstracts;* and (3) International Energy Agency, Biomass Conversion Technical Information Service, Dublin, Ireland, for *Biomass Abstracts*. In each case, the cognizant foreign agency provides the non-U.S. information to TIC for inclusion in the Energy Data Base; in turn, TIC provides the U.S. information for input into the respective journal.

Atomindex

A semimonthly abstract journal providing worldwide coverage of information on nuclear science and technology. *Atomindex* is available by subscription from UNIPUB, 345 Park Avenue South, New York, NY 10010. The cost of an annual subscription, 24 semimonthly issues and semiannual and annual cumulative indexes, is $290.

Biomass Abstracts

A bimonthly abstract journal with comprehensive coverage of information in any step involved in the eventual conversion of biomass to energy. *Biomass Abstracts* is available free to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Biomass Abstracts* from Biomass Conversion Technical Information Service, Institute for Industrial Research and Standards, Ballymun Road, Dublin 9, Ireland, for 42 IR pounds per year. Make checks payable to the Institute.

Coal Abstracts

A monthly abstract journal providing comprehensive worldwide coverage of information in the field of coal science and technology. *Coal Abstracts* is available to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Coal Abstracts* from IEA Coal Research, Technical Information Service, 14-15 Lower Grosvenor Place, London SW1W 0EX, England, for 100 pounds sterling per year.

International Copyright, © U. S. Department of Energy, 1983, under the provisions of the Universal Copyright Convention. United States copyright is not asserted under the United States Copyright Law, Title 17, United States Code.

energinfo ERA

Vol. 8, No. 10
ISSN: 0160-3604
CODEN: ERABD
May 31, 1983

ENERGY RESEARCH ABSTRACTS

ABOUT THE TECHNICAL INFORMATION CENTER

The Technical Information Center in Oak Ridge, Tennessee, has been the national center for scientific and technical information for the Department of Energy (DOE) and its predecessor agencies since 1946. In developing and managing DOE's technical information program, the Center places under bibliographic control not only DOE-originated information but also worldwide literature on scientific and technical advances in the energy field and announces the source and availability of this information. Whereas the literature of science is emphasized, coverage is extended to DOE programmatic, socioeconomic, environmental, legislative/regulatory, energy analysis, and policy-related areas. To accomplish this mission, the Center builds and maintains computerized energy-information data bases and disseminates this information via computerized retrieval systems and announcement publications such as abstracting journals, bibliographies, and update journals. Direct access to the Center's most comprehensive data base, the Energy Data Base, is available to the public through commercial on-line bibliographic retrieval systems. The Energy Data Base and many of the Center's energy-related data bases are available to DOE offices and contractors and to other government agencies via DOE/RECON, the Department's on-line information retrieval system. The Center has developed and maintains systems to record and communicate energy-related research-in-progress information, to maintain a register of DOE public communications publications, to track research report deliverables from DOE contractors, and to test and make available DOE-funded computer software programs with scientific and management applications. The Center also maintains a full-scale publishing capability to serve special publication needs of the Department. To effectively manage DOE's technical information resources, the Center's program is one of continual development and evaluation of new information products, systems, and technologies.

UNITED STATES DEPARTMENT OF ENERGY

Donald Paul Hodel
Secretary

Martha O. Hesse
Assistant Secretary
Management and Administration

William S. Heffelfinger
Director of Administration

Joseph G. Coyne
Manager
Technical Information Center

ABOUT *ENERGY RESEARCH ABSTRACTS*

Energy Research Abstracts (ERA) provides abstracting and indexing coverage of all scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses, and monographs originated by the U. S. Department of Energy, its laboratories, energy centers and contractors. *ERA* also covers other energy information prepared *in report form* by federal and state government organizations, foreign governments, and domestic and foreign universities and research organizations. The user should remain aware that *ERA* coverage of non-report literature is limited to that generated by Department of Energy activity.

ERA is comprehensive in its subject scope, encompassing the DOE's research, development, demonstration, and technological programs resulting from its broad charter for energy sources, supplies, safety, environmental impacts, and regulation.

ERA is available on an exchange basis to universities, research institutions, industrial firms, and publishers of scientific information. Inquiries should be directed to the Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

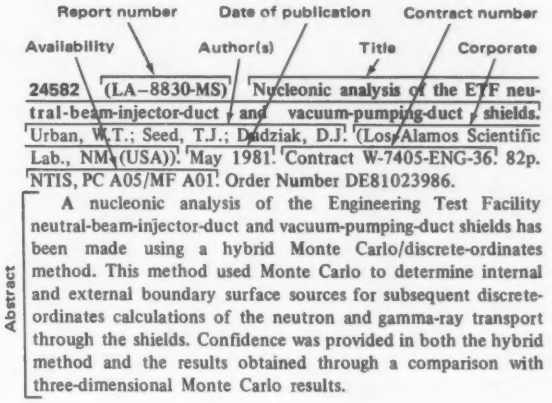
ERA is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues is $165.00 for domestic subscribers and $206.25 for foreign subscribers. A single issue costs $9.50 (domestic) or $11.90 (foreign). The cumulative indexes will be available in printed form from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, and in microfiche form from the National Technical Information Service, U. S. Department of Commerce, Springfield, Virginia 22161, and from Engineered Systems, P. O. Box 866, Oak Ridge, Tennessee 37830.

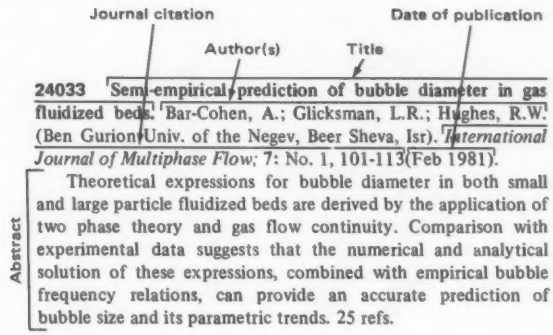
Published by the **United States Department of Energy, Technical Information Center**
P. O. Box 62, Oak Ridge, Tennessee 37830

HOW TO USE *ENERGY RESEARCH ABSTRACTS*

ABSTRACTS IN *ENERGY RESEARCH ABSTRACTS*

The principal elements of abstract entries for a typical research and development report and a typical technical journal article are illustrated below.


Report number
Date of publication
Contract number
Availability
Author(s)
Title
Corporate
24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. (Los Alamos Scientific Lab., NM (USA)). May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.
Abstract
A nucleonic analysis of the Engineering Test Facility neutral-beam-injector-duct and vacuum-pumping-duct shields has been made using a hybrid Monte Carlo/discrete-ordinates method. This method used Monte Carlo to determine internal and external boundary surface sources for subsequent discrete-ordinates calculations of the neutron and gamma-ray transport through the shields. Confidence was provided in both the hybrid method and the results obtained through a comparison with three-dimensional Monte Carlo results.


Journal citation
Date of publication
Author(s)
Title
24033 Semi-empirical prediction of bubble diameter in gas fluidized beds. Bar-Cohen, A.; Glicksman, L.R.; Hughes, R.W. (Ben Gurion Univ. of the Negev, Beer Sheva, Isr). International Journal of Multiphase Flow; 7: No. 1, 101-113 (Feb 1981).
Abstract
Theoretical expressions for bubble diameter in both small and large particle fluidized beds are derived by the application of two phase theory and gas flow continuity. Comparison with experimental data suggests that the numerical and analytical solution of these expressions, combined with empirical bubble frequency relations, can provide an accurate prediction of bubble size and its parametric trends. 25 refs.

INDEXES TO *ENERGY RESEARCH ABSTRACTS*

Five indexes are provided for approaching the contents of each issue of *Energy Research Abstracts (ERA)*. Each index is preceded by an introduction that details the organization of the index and the principles by which it was compiled. The reader is referred to these introductions for information not found in the index examples that follow.

• Corporate Author Index

Technical report literature is indexed using the name of the organization or institution responsible for the issuance of the report.

24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. **(Los Alamos Scientific Lab., NM (USA)).** May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.

is indexed as:

Los Alamos Scientific Lab., NM (USA)
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Personal Author Index

Each author's name is indexed in the form appearing on the document abstracted, with the exception that given names are reduced to initials:

Bar-Cohen, A., Semi-empirical prediction of bubble diameter in gas fluidized beds, 7:24033 (J:US)
Dudziak, D.J., *See* Urban, W.T., 6:24582
Glicksman, L.R., *See* Bar-Cohen, A., 7:24033
Hughes, R.W., *See* Bar-Cohen, A., 7:24033
Seed, T.J., *See* Urban, W.T., 6:24582
Urban, W.T., Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Subject Index

The subject index consisting of entries naming specific materials, objects, and processes is arranged alphabetically. Document titles, informative phrases, or both specific to these entries are arranged alphabetically under the entries.

TOKAMAK ETF
Neutral Atom Beam Injection
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)
Neutron Transport
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Contract Number Index

DOE technical literature is indexed using contract numbers under which the literature was produced. This index contains the contract number with corresponding abstract and report numbers.

W-7405-ENG-36	**Los Alamos National Lab., NM (USA)**	
	6:24582	LA–8830-MS

• Report Number Index

Technical report literature is also indexed using report numbers. This index includes information on where individual reports may be obtained. Patents and conference papers are indexed here as a matter of convenience. When a report is supplied under an Order Number, that number is included in the availability statement. An Order Number–Report Number Correlation is included for convenience.

LA–		
8830-MS	6:24582	NTIS, PC A05/MF A01. Order Number DE81023986, Distribution Category STD-20d

STAFF OF ENERGY RESEARCH ABSTRACTS

Editor
David E. Bost

Assistant Editors
Lee M. Thompson
Charles E. Stuber

Associate Editors for Fossil Energy
M. Catherine Grissom
D. Lamar Cason
Dorothy M. Chertok
Lynda H. Kern
Betty L. McDowell
Lorne T. Newman
Donna G. Powers
Amy T. Tamura

Associate Editors for Physical Sciences and Engineering
Robert C. Kelly
Jack Blanshei
Lisbeth C. Lieberman
W. Hugh Kinser
George H. Thoeming

Associate Editors for Environmental, Biomedical, and Life Sciences
Sidney F. Lanier
E. Ray Bedford
Polly S. Blackburn
Jane G. Buchanan
Robert J. Chertok
Kathleen R. Meyer
Axel C. Ringe
David L. Snow

Associate Editors for Nuclear Energy
Henry D. Raleigh
David C. Cunningham
James R. Dulaney
Lawrence T. Whitehead
Milton O. Whitson

Associate Editors for Conservation and Solar Energy
Lila B. Smith
Dona C. Keller
Mona H. Raridon
Jerry M. Thomas
Martha C. Wilson
Larry E. Williams

Subject Heading Specialist
Julia S. Redford

Corporate Author Specialist
Patsy L. Hendricks

Report Number Specialist
Wanda Parks

Contract Number Specialist
William D. Matheny

Cataloging and Digitizing Coordinator
J. Paul Meredith

Computer Processing Coordinator
Billy H. Brady

Publishing Coordinator
Irene D. Keller

Communication concerning the editorial policy and content of *Energy Research Abstracts* should be addressed to the Editor, *Energy Research Abstracts*, Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

SUBJECT CONTENTS (NUMERICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts.* The following listing includes the totality of the 40 first-level and 294 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope notes is available as DOE/TIC-4584-R4 from NTIS for $7.00.

01 COAL AND COAL PRODUCTS
- 04 Processing
- 05 By-Products
- 06 Properties
- 08 Waste Management
- 09 Environmental Aspects
- 10 Reserves and Exploration
- 20 Mining
- 30 Transport and Handling
- 40 Combustion
- 50 Marketing and Economics
- 60 Health and Safety
- 70 Regulations

02 PETROLEUM
- 01 Reserves
- 02 Geology and Exploration
- 03 Drilling and Production
- 04 Processing
- 05 Products and By-Products
- 06 Health and Safety
- 07 Marketing and Economics
- 08 Waste Management
- 09 Environmental Aspects
- 10 Policy, Legislation, and Regulation
- 20 Transport, Pipelines, and Handling
- 30 Properties
- 40 Storage
- 50 Combustion

03 NATURAL GAS
- 01 Reserves
- 02 Geology and Exploration
- 03 Drilling, Production, and Processing
- 04 Products and By-Products
- 05 Health and Safety
- 06 Marketing and Economics
- 07 Waste Management
- 08 Environmental Effects
- 09 Artificial Stimulation, Plowshare, etc.
- 10 Policy, Legislation, and Regulation
- 20 Transport, Pipelines, and Handling
- 30 Properties
- 40 Combustion
- 50 Storage

04 OIL SHALES AND TAR SANDS
- 01 Reserves and Exploration
- 02 Site Geology and Hydrology
- 03 Drilling, Fracturing, and Mining
- 04 Oil Production, Recovery, and Refining
- 05 Properties and Composition
- 06 Direct Uses and By-Products
- 07 Health and Safety
- 08 Marketing and Economics
- 09 Waste Research and Management
- 10 Environmental Aspects
- 20 Regulations

05 NUCLEAR FUELS
- 01 Reserves
- 02 Exploration
- 03 Mining
- 04 Feed Processing
- 05 Enrichment
- 06 By-Products
- 07 Fuels Production and Properties
- 08 Spent Fuels Reprocessing
- 09 Transport and Storage
- 10 Marketing and Economics
- 20 Waste Management
- 30 Environmental Aspects
- 40 Health and Safety
- 50 Regulations

06 FUSION FUELS
- 01 Sources
- 02 Processing
- 03 By-Products
- 04 Transport and Storage
- 05 Health and Safety
- 06 Regulations and Policy
- 07 Waste Management
- 08 Properties
- 09 Environmental Aspects

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY
- 01 Physical Isotope Separation
- 02 Radiation Sources
- 03 Isotopic Power Supplies

08 HYDROGEN
- 01 Production
- 02 Storage
- 03 Transport
- 04 Marketing and Economics
- 05 Safety
- 06 Industrial and Commercial Use
- 07 By-Products
- 08 Properties
- 09 Environmental Aspects

09 OTHER SYNTHETIC AND NATURAL FUELS
- 01 Hydrocarbon Fuels
- 02 Alcohol Fuels
- 03 Inorganic Hydrogen Compound Fuels
- 04 Solid Waste Fuels
- 05 Liquid Waste Fuels
- 06 Gaseous Waste Fuels

13 HYDRO ENERGY
- 01 Resources and Availability
- 02 Site Geology and Meteorology
- 03 Plant Design and Operation
- 04 Regulations and Licensing
- 05 Economics and Management
- 06 Environmental Aspects
- 07 Power Conversion Systems

14 SOLAR ENERGY
- 01 Resources and Availability
- 03 Economics
- 04 Environmental, Legal, and Institutional Aspects
- 05 Solar Energy Conversion
- 06 Photovoltaic Power Plants
- 07 Solar Thermal Power Plants
- 08 Ocean Thermal Gradient Power Plants
- 09 Solar Radiation Utilization
- 10 Solar Collectors and Concentrators
- 20 Heat Storage

15 GEOTHERMAL ENERGY
- 01 Resource Status and Assessment
- 02 Geology, Hydrology, and Geothermal Systems
- 03 Geothermal Exploration and Exploration Technology
- 04 Legal and Institutional Aspects

15 GEOTHERMAL ENERGY (CONT.)
- 05 Economic and Financial Aspects
- 06 Environmental Aspects and Waste Disposal
- 07 By-Products
- 08 Geothermal Power Plants
- 09 Geothermal Engineering
- 10 Direct Energy Utilization
- 20 Geothermal Data and Theory

16 TIDAL POWER
- 03 Regulations
- 04 Economics
- 05 Environmental Aspects
- 07 Tidal Power Plants
- 08 Wave Energy Converters

17 WIND ENERGY
- 01 Availability (Climatology)
- 03 Regulations
- 04 Economics
- 05 Environmental Aspects
- 06 Wind Energy Engineering

20 ELECTRIC POWER ENGINEERING
- 01 Power Plants and Power Generation
- 02 Environmental Aspects
- 03 Power Transmission and Distribution

21 NUCLEAR POWER PLANTS
- 01 Power Reactors, Non-Breeding, Light-Water Moderated, Boiling Water Cooled
- 02 Power Reactors, Non-Breeding, Light-Water Moderated, Non-Boiling Water Cooled
- 03 Power Reactors, Non-Breeding, Graphite Moderated
- 04 Power Reactors, Non-Breeding, Otherwise Moderated or Unmoderated
- 05 Power Reactors, Breeding
- 06 Power Reactors, Auxiliary, Mobile, Package, and Transportable
- 07 Regulation and Licensing
- 08 Economics
- 09 Process Heat Reactors

22 NUCLEAR REACTOR TECHNOLOGY
- 01 Theory and Calculation
- 02 Components and Accessories
- 03 Fuel Elements
- 04 Control Systems
- 05 Environmental Aspects
- 06 Research, Test, and Experimental Reactors
- 07 Plutonium and Isotope Production Reactors
- 08 Propulsion Reactors
- 09 Reactor Safety

25 ENERGY STORAGE
- 01 Magnetic
- 02 Compressed Gas
- 03 Pumped Hydro
- 04 Capacitor Banks
- 05 Flywheels
- 06 Thermal
- 07 Liquefied Gas
- 08 Chemical
- 09 Batteries

29 ENERGY PLANNING AND POLICY
- 01 Energy Analysis and Modeling
- 02 Economics and Sociology
- 03 Environment, Health, and Safety
- 04 Natural Resources
- 05 Research, Development, Demonstration, and Commercialization
- 06 Nuclear Energy
- 07 Transport and Storage
- 08 Waste Heat Utilization
- 10 Conservation
- 20 Supply, Demand, and Forecasting
- 30 Policy, Legislation, and Regulation
- 40 Fossil Fuels
- 50 Hydrogen and Synthetic Fuels
- 60 Electric Power
- 80 Consumption and Utilization
- 90 Unconventional Sources and Power Generation

30 ENERGY CONVERSION
- 01 MHD Generators
- 02 EHD Generators
- 03 Thermoelectric Generators
- 04 Thermionic Converters
- 05 Fuel Cells
- 08 Electromechanical Converters

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION
- 01 Buildings
- 02 Transportation
- 03 Industry and Agriculture
- 06 Municipalities and Community Systems
- 09 Education and Public Relations

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS
- 01 Internal Combustion Engines
- 02 External Combustion Engines
- 03 Electric-Powered Systems
- 04 Hybrid Systems
- 05 Flywheel Propulsion
- 06 Vehicle Design Factors
- 07 Emission Control
- 08 Alternative Fuels

36 MATERIALS
- 01 Metals and Alloys
- 02 Ceramics, Cermets, and Refractories
- 03 Composite Materials
- 04 Polymers and Plastics
- 06 Other Materials

40 CHEMISTRY
- 01 Analytical and Separations Chemistry
- 02 Inorganic and Physical Chemistry
- 03 Organic Chemistry
- 04 Electrochemistry
- 05 Photochemistry
- 06 Radiation Chemistry
- 07 Radiochemistry and Nuclear Chemistry
- 08 Combustion Chemistry

42 ENGINEERING
- 01 General Engineering
- 02 Facilities and Equipment
- 03 Lasers
- 04 Heat Transfer and Fluid Flow
- 05 Materials Testing

42 ENGINEERING (CONT.)
- 06 Safety Engineering
- 07 Vacuum Engineering
- 08 Electronic Circuits and Devices
- 09 Waste Processing Plants and Equipment
- 10 Combustion Systems
- 20 Underground Engineering
- 30 Marine Engineering
- 40 Pollution Control Equipment
- 50 Power Cycles

43 PARTICLE ACCELERATORS
- 01 Design, Development, and Operation
- 02 Beam Dynamics, Field Calculations, and Ion Optics
- 03 Auxiliaries and Components
- 04 Storage Rings

44 INSTRUMENTATION
- 01 Radiation Instrumentation
- 02 Radiation Effects on Instrument Components, Instruments, or Electronic Systems
- 03 Miscellaneous Instruments
- 04 Well Logging Instrumentation

45 EXPLOSIONS AND EXPLOSIVES
- 01 Chemical
- 02 Nuclear
- 03 Explosion Detection

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 04 Thermal Effluents Monitoring and Transport
- 05 Site Resource and Use Studies
- 06 Regulations

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 04 Thermal Effluents Monitoring and Transport
- 05 Site Resource and Use Studies
- 06 Regulations

52 ENVIRONMENTAL SCIENCES, AQUATIC
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 04 Thermal Effluents Monitoring and Transport
- 05 Site Resource and Use Studies
- 06 Regulations

53 ENVIRONMENTAL–SOCIAL ASPECTS OF ENERGY TECHNOLOGIES
- 01 Social and Economic Studies
- 02 Assessment of Energy Technologies
- 03 Environmental Impact Statements

55 BIOMEDICAL SCIENCES, BASIC STUDIES
- 01 Behavioral Biology
- 02 Biochemistry
- 03 Cytology
- 04 Genetics
- 05 Metabolism
- 06 Medicine
- 07 Microbiology
- 08 Morphology
- 09 Pathology
- 10 Physiological Systems
- 20 Public Health
- 30 Agriculture and Food Technology

56 BIOMEDICAL SCIENCES, APPLIED STUDIES
- 01 Radiation Effects
- 02 Thermal Effects
- 03 Chemicals Metabolism and Toxicity
- 04 Other Environmental Pollutant Effects

57 HEALTH AND SAFETY

58 GEOSCIENCES
- 01 Geology and Hydrology
- 02 Geophysics
- 03 Mineralogy, Petrology, and Rock Mechanics
- 04 Geochemistry
- 05 Oceanography

64 PHYSICS RESEARCH
- 01 Astrophysics and Cosmology
- 02 Atmospheric Physics
- 03 Atomic, Molecular, and Chemical Physics
- 04 Fluid Physics
- 50 High Energy Physics

65 PHYSICS RESEARCH (CONT.)
- 10 Nuclear Physics
- 40 Radiation and Shielding Physics
- 50 Medical Physics
- 60 Solid State Physics
- 70 Theoretical Physics
- 80 Mathematical Physics
- 90 Communication, Education, History, and Philosophy

70 FUSION ENERGY
- 01 Plasma Research
- 02 Fusion Power Plant Technology

99 GENERAL AND MISCELLANEOUS
- 01 Management
- 02 Mathematics and Computers
- 03 Information Handling
- 04 Law
- 05 Civilian Defense

CORPORATE AUTHOR INDEX

PERSONAL AUTHOR INDEX

SUBJECT INDEX

CONTRACT NUMBER INDEX

REPORT NUMBER INDEX

ORDER NUMBER CORRELATION

SUBJECT CONTENTS (ALPHABETICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts*. The following listing includes the totality of the 40 first-level and 294 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope notes is available as DOE/TIC-4584-R4 from NTIS for $7.00.

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS
- 08 Alternative Fuels
- 03 Electric-Powered Systems
- 07 Emission Control
- 02 External Combustion Engines
- 05 Flywheel Propulsion
- 04 Hybrid Systems
- 01 Internal Combustion Engines
- 06 Vehicle Design Factors

56 BIOMEDICAL SCIENCES, APPLIED STUDIES
- 03 Chemicals Metabolism and Toxicity
- 04 Other Environmental Pollutant Effects
- 01 Radiation Effects
- 02 Thermal Effects

55 BIOMEDICAL SCIENCES, BASIC STUDIES
- 30 Agriculture and Food Technology
- 01 Behavioral Biology
- 02 Biochemistry
- 03 Cytology
- 04 Genetics
- 06 Medicine
- 05 Metabolism
- 07 Microbiology
- 08 Morphology
- 09 Pathology
- 10 Physiological Systems
- 20 Public Health

40 CHEMISTRY
- 01 Analytical and Separations Chemistry
- 08 Combustion Chemistry
- 04 Electrochemistry
- 02 Inorganic and Physical Chemistry
- 03 Organic Chemistry
- 05 Photochemistry
- 06 Radiation Chemistry
- 07 Radiochemistry and Nuclear Chemistry

01 COAL AND COAL PRODUCTS
- 05 By-Products
- 40 Combustion
- 09 Environmental Aspects
- 60 Health and Safety
- 50 Marketing and Economics
- 20 Mining
- 04 Processing
- 06 Properties
- 70 Regulations
- 10 Reserves and Exploration
- 30 Transport and Handling
- 08 Waste Management

20 ELECTRIC POWER ENGINEERING
- 02 Environmental Aspects
- 01 Power Plants and Power Generation
- 03 Power Transmission and Distribution

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION
- 01 Buildings
- 09 Education and Public Relations
- 03 Industry and Agriculture
- 06 Municipalities and Community Systems
- 02 Transportation

30 ENERGY CONVERSION
- 02 EHD Generators
- 08 Electromechanical Converters
- 05 Fuel Cells
- 01 MHD Generators
- 04 Thermionic Converters
- 03 Thermoelectric Generators

29 ENERGY PLANNING AND POLICY
- 10 Conservation
- 80 Consumption and Utilization
- 02 Economics and Sociology
- 60 Electric Power
- 01 Energy Analysis and Modeling
- 03 Environment, Health, and Safety
- 40 Fossil Fuels
- 50 Hydrogen and Synthetic Fuels
- 04 Natural Resources
- 06 Nuclear Energy
- 30 Policy, Legislation, and Regulation
- 05 Research, Development, Demonstration, and Commercialization
- 20 Supply, Demand, and Forecasting
- 07 Transport and Storage
- 90 Unconventional Sources and Power Generation
- 08 Waste Heat Utilization

25 ENERGY STORAGE
- 09 Batteries
- 04 Capacitor Banks
- 08 Chemical
- 02 Compressed Gas
- 05 Flywheels
- 07 Liquefied Gas
- 01 Magnetic
- 03 Pumped Hydro
- 06 Thermal

42 ENGINEERING
- 10 Combustion Systems
- 08 Electronic Circuits and Devices
- 02 Facilities and Equipment
- 01 General Engineering
- 04 Heat Transfer and Fluid Flow
- 03 Lasers
- 30 Marine Engineering
- 05 Materials Testing
- 40 Pollution Control Equipment
- 50 Power Cycles
- 06 Safety Engineering
- 20 Underground Engineering
- 07 Vacuum Engineering
- 09 Waste Processing Plants and Equipment

52 ENVIRONMENTAL SCIENCES, AQUATIC
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 06 Regulations
- 05 Site Resource and Use Studies
- 04 Thermal Effluents Monitoring and Transport

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 06 Regulations
- 05 Site Resource and Use Studies
- 04 Thermal Effluents Monitoring and Transport

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 06 Regulations
- 05 Site Resource and Use Studies
- 04 Thermal Effluents Monitoring and Transport

53 ENVIRONMENTAL–SOCIAL ASPECTS OF ENERGY TECHNOLOGIES
- 02 Assessment of Energy Technologies
- 03 Environmental Impact Statements
- 01 Social and Economic Studies

45 EXPLOSIONS AND EXPLOSIVES
- 01 Chemical
- 03 Explosion Detection
- 02 Nuclear

70 FUSION ENERGY
- 02 Fusion Power Plant Technology
- 01 Plasma Research

06 FUSION FUELS
- 03 By-Products
- 09 Environmental Aspects
- 05 Health and Safety
- 02 Processing
- 08 Properties
- 06 Regulations and Policy
- 01 Sources
- 04 Transport and Storage
- 07 Waste Management

99 GENERAL AND MISCELLANEOUS
- 05 Civilian Defense
- 03 Information Handling
- 04 Law
- 01 Management
- 02 Mathematics and Computers

58 GEOSCIENCES
- 04 Geochemistry
- 01 Geology and Hydrology
- 02 Geophysics
- 03 Mineralogy, Petrology, and Rock Mechanics
- 05 Oceanography

15 GEOTHERMAL ENERGY
- 07 By-Products
- 10 Direct Energy Utilization
- 05 Economic and Financial Aspects
- 06 Environmental Aspects and Waste Disposal
- 02 Geology, Hydrology, and Geothermal Systems
- 20 Geothermal Data and Theory
- 09 Geothermal Engineering
- 03 Geothermal Exploration and Exploration Technology
- 08 Geothermal Power Plants
- 04 Legal and Institutional Aspects
- 01 Resource Status and Assessment

57 HEALTH AND SAFETY

13 HYDRO ENERGY
- 05 Economics and Management
- 06 Environmental Aspects
- 03 Plant Design and Operation
- 07 Power Conversion Systems
- 04 Regulations and Licensing
- 01 Resources and Availability
- 02 Site Geology and Meteorology

08 HYDROGEN
- 07 By-Products
- 09 Environmental Aspects
- 06 Industrial and Commercial Use
- 04 Marketing and Economics
- 01 Production
- 08 Properties
- 05 Safety
- 02 Storage
- 03 Transport

44 INSTRUMENTATION
- 03 Miscellaneous Instruments
- 02 Radiation Effects on Instrument Components, Instruments, or Electronic Systems
- 01 Radiation Instrumentation
- 04 Well Logging Instrumentation

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY
- 03 Isotopic Power Supplies
- 01 Physical Isotope Separation
- 02 Radiation Sources

36 MATERIALS
- 02 Ceramics, Cermets, and Refractories
- 03 Composite Materials
- 01 Metals and Alloys
- 06 Other Materials
- 04 Polymers and Plastics

03 NATURAL GAS
- 09 Artificial Stimulation, Plowshare, etc.
- 40 Combustion
- 03 Drilling, Production, and Processing
- 08 Environmental Effects
- 02 Geology and Exploration
- 05 Health and Safety
- 06 Marketing and Economics
- 10 Policy, Legislation, and Regulation
- 04 Products and By-Products
- 30 Properties
- 01 Reserves
- 50 Storage
- 20 Transport, Pipelines, and Handling
- 07 Waste Management

05 NUCLEAR FUELS
- 06 By-Products
- 05 Enrichment
- 30 Environmental Aspects
- 02 Exploration
- 04 Feed Processing
- 07 Fuels Production and Properties
- 40 Health and Safety
- 10 Marketing and Economics
- 03 Mining
- 50 Regulations
- 01 Reserves
- 08 Spent Fuels Reprocessing
- 09 Transport and Storage
- 20 Waste Management

21 NUCLEAR POWER PLANTS
- 08 Economics
- 06 Power Reactors, Auxiliary, Mobile, Package, and Transportable
- 05 Power Reactors, Breeding
- 03 Power Reactors, Non-Breeding, Graphite Moderated
- 01 Power Reactors, Non-Breeding, Light-Water Moderated, Boiling Water Cooled
- 02 Power Reactors, Non-Breeding, Light-Water Moderated, Non-Boiling Water Cooled
- 04 Power Reactors, Non-Breeding, Otherwise Moderated or Unmoderated
- 09 Process Heat Reactors
- 07 Regulation and Licensing

22 NUCLEAR REACTOR TECHNOLOGY
- 02 Components and Accessories
- 04 Control Systems
- 05 Environmental Aspects
- 03 Fuel Elements
- 07 Plutonium and Isotope Production Reactors
- 08 Propulsion Reactors
- 09 Reactor Safety
- 06 Research, Test, and Experimental Reactors
- 01 Theory and Calculation

04 OIL SHALES AND TAR SANDS
- 06 Direct Uses and By-Products
- 03 Drilling, Fracturing, and Mining
- 10 Environmental Aspects
- 07 Health and Safety
- 08 Marketing and Economics
- 04 Oil Production, Recovery, and Refining
- 05 Properties and Composition
- 20 Regulations
- 01 Reserves and Exploration
- 02 Site Geology and Hydrology
- 09 Waste Research and Management

09 OTHER SYNTHETIC AND NATURAL FUELS
02 Alcohol Fuels
06 Gaseous Waste Fuels
01 Hydrocarbon Fuels
03 Inorganic Hydrogen Compound Fuels
05 Liquid Waste Fuels
04 Solid Waste Fuels

43 PARTICLE ACCELERATORS
03 Auxiliaries and Components
02 Beam Dynamics, Field Calculations, and Ion Optics
01 Design, Development, and Operation
04 Storage Rings

02 PETROLEUM
50 Combustion
03 Drilling and Production
09 Environmental Aspects
02 Geology and Exploration
06 Health and Safety
07 Marketing and Economics
10 Policy, Legislation, and Regulation
04 Processing
05 Products and By-Products
30 Properties
01 Reserves
40 Storage
20 Transport, Pipelines, and Handling
08 Waste Management

64 PHYSICS RESEARCH
01 Astrophysics and Cosmology
02 Atmospheric Physics
03 Atomic, Molecular, and Chemical Physics
04 Fluid Physics
50 High Energy Physics

65 PHYSICS RESEARCH (CONT.)
90 Communication, Education, History, and Philosophy
80 Mathematical Physics
50 Medical Physics
10 Nuclear Physics
40 Radiation and Shielding Physics
60 Solid State Physics
70 Theoretical Physics

14 SOLAR ENERGY
03 Economics
04 Environmental, Legal, and Institutional Aspects
20 Heat Storage
08 Ocean Thermal Gradient Power Plants
06 Photovoltaic Power Plants
01 Resources and Availability
10 Solar Collectors and Concentrators
05 Solar Energy Conversion
09 Solar Radiation Utilization
07 Solar Thermal Power Plants

16 TIDAL POWER
04 Economics
05 Environmental Aspects
03 Regulations
07 Tidal Power Plants
08 Wave Energy Converters

17 WIND ENERGY
01 Availability (Climatology)
04 Economics
05 Environmental Aspects
03 Regulations
06 Wind Energy Engineering

CORPORATE AUTHOR INDEX

PERSONAL AUTHOR INDEX

SUBJECT INDEX

CONTRACT NUMBER INDEX

REPORT NUMBER INDEX

ORDER NUMBER CORRELATION

ENERGY RESEARCH ABSTRACTS

01 COAL AND COAL PRODUCTS

22898 (ORNL—5944) Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982. McNeese, L.E. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 287p. NTIS, PC A13/MF A01. Order Number DE83008792.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This quarterly report covers the progress made during the period October 1 through December 31 for the Oak Ridge National Laboratory research and development projects that are carried out in support of the increased utilization of coal and other fossil fuels as sources of clean energy. These projects are supported by various parts of DOE including Fossil Energy, Basic Energy Sciences, Office of Health and Environmental Research, Office of Environmental Compliance and Overview, the Electric Power Research Institute, and by the Tennessee Valley Authority and the EPA Office of Research and Development through inter-agency agreement with the DOE.

0104 Processing

REFER ALSO TO CITATION(S) 22950, 22951, 22952, 22955, 22983, 22989, 22995, 23011, 23218, 23219, 23221, 23223, 23223, 23224, 23228, 23229, 23230, 23231, 23232, 23233, 23234, 23235, 23236, 23416, 23423, 23781, 23782, 24057, 24241, 24258

22899 (ANL/NESC—979R) ASPEN; advanced system for process engineering. Aspen Project Staff, T. (USDOE Morgantown Energy Technology Center, WV). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048979.

ASPEN (Advanced System for Process Engineering) is a state-of-the-art process simulator and economic evaluation package which was designed for use in engineering fossil energy conversion processes. ASPEN can represent multiphase streams, including solids, and handle complex substances such as coal. The system can perform steady-state material and energy balances, determine equipment size and cost, and carry out preliminary economic evaluations. It is supported by a comprehensive physical property system for computation of major properties such as enthalpy, entropy, free energy, molar volume, equilibrium ratio, fugacity coefficient, viscosity, thermal conductivity, diffusion coefficient, and thermal conductivity for specified phase conditions - vapor, liquid, or solid. The properties may be computed for pure components, mixtures, or components in a mixture, as appropriate. The ASPEN Input Language is oriented towards process engineers.IBM303x;DEC VAX11/780; FORTRAN IV (99%) and Assembly language (1%) for the IBM CMS version. All of ASPEN except easily replaceable system utilities is written in ANS FORTRAN X3.9-1966. THE DEC VAX version is completely FORTRAN IV.; VM/CMS (IBM303x), VMS 2.4,2.5 (DEC VAX11/780); The IBM CMS transmittal tape is recorded at 6250 bpi. The IBM version CMS edition requires approximately 200 cylinders of IBM3350 or equivalent disk storage for the ASPEN system account, using three minidisks of 115, 30, and 35 cylinders, respectively, on an IBM3350 or equivalent disk drive and 2 megabytes of virtual storage. In addition, 5 cylinders of IBM3350 or equivalent disk storage and 2 megabytes of virtual storage are needed for each user account. The DEC VAX version requires approximately 3 megabytes of virtual storage in addition to approximately 150K blocks of disk storage for the system account, and 20K blocks of disk storage for each user account..

22900 (ARL-TR—30) Application of pyrolysis technology to the utilization of eastern Canadian coals. Abbott, D.; Scott, D.S. (National Research Council of Canada, Halifax, Nova Scotia). 1982. 298p. (NRCC—19903). National Research Council of Canada, Halifax, Nova Scotia.

Industry representatives, government program directors and research workers reviewed the technical challenges of using pyrolysis to produce liquid fuels and combustible residues from the high volatile bituminous caking coals of eastern Canada. The object was, by discussing likely industrial developments and present back-up research and development activities, to identify the direction that future R and D should take in adequately supporting the attempts to establish a conversion industry in eastern Canada.

22901 (ARL-TR—30, pp 6-29) The flash pyrolysis and hydropyrolysis of coal. Steinberg, M. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

This article describes flash pyrolysis and flash hydropyrolysis and compares the yields and product distribution for several pyrolysis and hydropyrolysis processes using data obtained for Pittsburgh HVB, lignite, and a sub-bituminous coal. The reactor systems considered are electrically heated tube; Garrett-occidental system-heat with char; flash hydropyrolysis entrained flow with hydrogen; Rockwell-short residence time, hydrogen entrainment; and Avco gasifier char combustion and steam gasification. (18 refs.)

22902 (ARL-TR—30, pp 30-58) Coal pyrolysis by hot dolomitic solids from a fluidized bed combustor. Longwell, J.P.; Howard, J.B.; Peters, W.A.; Yeboah, Y.D. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

Atmospheric pressure pyrolysis of Illinois No. 6 bituminous coal and Texas lignite were studied at 425-875 C in a fluidized bed in the presence and absence of different calcined dolomitic stones. Product yields, elemental compositions of char and tar, molecular composition of the gas, fractional distributions of original coal heating value and sulfur in the products, and extents of vapor pressure desulfurization and decarbonization by the dolomitic stones were determined to assess the technical feasibility of this M.I.T. coal processing scheme. (4 refs.)

22903 (ARL-TR—30, pp 110-137) The CS/R process. Fling, W.A.; Hamshar, J.A. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

Cities Service and Rockwell International are involved in the joint development of the CS/R Hydrogasification Process for the conversion of coal to substitute natural gas (SNG) benzene, transportation fuels, and petrochemical feedstocks. Based on aerospace rock technology, pulverized coal is directly reacted with heated hydrogen quickly quenched to produce the desired product slate. For this discussion an intermediate product slate is studied in which a spectrum of petrochemical feedstocks and fuels is produced. Reactor products were determined for an Alberta subbituminous coal feedstock using Cities Service's bench-scale unit. A conceptual commercial flowsheet representing a grass roots plant at Mine Mouth is tailored for production of merchant petrochemicals and fuels equivalent to 100,000 Bbl/day of crude oil. Product yield, efficiencies and capital cost estimates are made based on mid 1981 prices. Operating costs and required product prices are estimated. The required product prices are favorable compared to current world rates. (20 refs.)

22904 (ARL-TR—30, pp 138-149) **Results of the IEA pyrolysis project at Bergbau-Forschung.** Wanzl, K.; van Heek, K.H.; Juntgen, H. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

An objective of the IEA Pyrolysis Project is to extend the basic scientific knowledge in certain areas of coal pyrolysis, namely pyrolysis at high pressure, in reactive atmospheres, and under conditions of rapid heating. In this paper the scope of the project and a choice of results of the basic experimental laboratory investigations relevant to this meeting are presented. Experimental work presented includes a comparison between two high volatile Ruhr coals and Canadian run-of-mine Devco coal. (6 refs.)

22905 (ARL-TR—30, pp 150-184) **The Canmet research program on coal pyrolysis - application to eastern Canada.** Fouda, S. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

The Canadian government is actively supporting coal liquefaction contract programs through CANMET. Early in June, 1980, Kilborn Limited was awarded a contract to design, construct and operate a bench scale, high pressure, flash hydropyrolysis unit to develop fundamental information for the processing of Canadian coals using this technology. Drawing on the experience of Brookhaven National Laboratories in Upton, N.Y., Kilborn has completed the design of a 1 kg/hr flash hydropyrolysis pilot unit and construction is presently in the final stages at the Ontario Research Foundation, (ORF) in Mississauga, Ontario. In this paper, the CANMET unit is described, and the test program is discussed especially with application to Eastern coals. This is followed by a brief mention of the current flash pyrolysis and hydropyrolysis processes with some of the key results obtained by previous investigators. The last section demonstrates the importance of pyrolysis research and development work in the Maritimes. (16 refs.)

22906 (ARL-TR—30, pp 185-212) **The pyrolysis of Canadian coals for the production of fuels and petrochemicals.** Furimsky, E.; Belanger, R.; Jorgensen, J. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

Thirteen Canadian coals of different ranks were evaluated as feedstocks for production of fuels and petrochemicals by pyrolysis. The yields of reaction water, gases and liquids produced during Fischer assay pyrolysis at 535 C, were measured quantitatively and were correlated with the H/C ratios and volatile matter content of the coal. Linear correlations were observed for all bituminous coals; lignites and sub-bituminous coals produced too low yields of liquid hydrocarbons. The deviation is explained in terms of the presence of O-containing functional groups. The experimental approach used in the present work has proved to be applicable to a series of coals where the aim is to identify the most suitable coals for production of volatile hydrocarbons by pyrolysis. (16 refs.)

22907 (ARL-TR—30, pp 213-234) **An overview of coal liquefaction, processes with special reference to the pyrolysis of eastern Canadian coals.** Mikhlin, J.A. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

Considers direct liquefaction, indirect liquefaction, and pyrolysis and hydropyrolysis in relation to Canadian coal conversion to liquid products. Properties of run-of-the mine Devco coal are tabulated. Specific features, flow diagrams, problem areas, updated status, and commercialization prospects are discussed for fourteen coal liquefaction processes reviewed by SNC for CANMET (and published in nine volumes.) In this paper emphasis is on possible applications of coal pyrolysis options to the utilization of Atlantic coals.

22908 (ARL-TR—30, pp 235-266) **Liquefaction of Cape Breton coals.** Anderson, N.E. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

The Cape Breton coals are good potential candidates for liquefaction to produce transportation fuels. The processes that appear to have the most potential for high distillate product yields (3.2-4.0 barrels per tonne of dry, ash-free coal) include direct liquefaction (H-coal), solvent extraction (NCB LSE) and indirect liquefaction (Mobil MTG). To obtain data specific to Cape Breton coals, test programs must be conducted by the various process developers. (11 refs.)

22909 (ARL-TR—30, pp 267-273) **Opportunities for pyrolysis technology in producing gas and combustible residues for use in electric power generation.** McCaig, I.W. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

The choice of coal liquefaction process depends on the products market price and on the process cost and thermodynamic efficiency. An electrical power utility cannot afford to pay more than 37 dollars/tonne (1977 prices) to generate power at base load, since for higher coal prices the CANDU reactor generates electrical energy more economically. Two sources of coal are examined, namely from the Devco mine in Nova Scotia and the Hat Creek deposit in British Columbia. Rival processes for power production are compared. Since electrical utilities are only interested in solid residue at less than 2 dollars/mJ, the question is raised if hydropyrolysis can give sufficient valuable liquid or gas fuels to pay for the cost of pyrolysis and product refining.

22910 (ARL-TR—30, pp 275-291) **Bibliography coal pyrolysis 1980-1981.** Abbott, D. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

As the literature on pyrolysis is voluminous, this compilation is confined to the period 1980-1981 and to that appearing in English. References are given alphabetically by the first named author. A subject index is compiled based on the titles of papers. (124 refs.)

22911 **(BCRA-CRR—96) The influence of tar and pitch additions to caking coals on the anisotropic composition and microstrength of coke.** (British Carbonization Research Association, Chesterfield). Dec 1981. 29p. British Carbonization Research Association, Chesterfield.

Assessments were made of the anisotropic composition of 1000 C cokes prepared by the co-carbonization, on the laboratory scale, of medium-rank coals with coal tar or pitch and the data were compared with the 'coke material' strength as measured by the microstrength test. The addition of 5-25 per cent of coal tar or pitch to coals of NCB classification 500-700 improved, in differing degrees according to the coal rank, the optical anisotropy of cokes prepared on the laboratory scale; the pitches were the more effective additives. There was also a corresponding increase in the coke microstrength, and in general the increase in microstrength could be correlated with the coke anisotropy and with the amount of tar or pitch additive. (11 refs.)

22912 **(BMFT-FB-T—79-78) Further development on a 170 MW prototype plant with pressurized coal gasification and gas-/steam turbine power plant at Luenen.** Krieb, K.H.; Dorstewitz, U.; Rhein, H. (STEAG A.G., Essen (Germany, F.R.)). Dec 1977. 166p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750315.

Portions are illegible in microfiche products.

1. Objective: Experimental operation of KDV 170 MW power plant Luenen, consist of a combined gas-/steam turbine process with supercharged boilers and series connected with Lurgi-coal pressure gasification plant with air; determination of operation behaviour and in view of operations improvements. 2. Results: After applying extensive operation imrprovements the plant was run 8.000 hours for the project. During this operation 232.000 tons of coal with different qualities were gasified and the power output was of 662 kWh. The longest continous operation period - with gas from coal - was of 116 days. For the use of lump coal with a low caking capacity and high inerts content the KDV-prototype plant is

technical applicable. Emission of dust, nitrogen oxides, chlorine and fluorine was definitively lower when compared to conventional power stations. The Luenen KDV plant is not equiped with industrial-scale fuel gas desulphurisation. The operational behaviour with respect to load change and frequency control does not comply yet fully with power stations' requirements. The process efficiency aimed at was not attained. Here, further improvements are necessary and possible to reduce the losses between coal pressure gasification and combined cycle. This applies in particular to gasification and gas treatment. 3. Correlations with other projects. The project was carried out on the basis of available results from the project 'KDV-Technologien' dealing with component development of KDV power stations and which is sponsored by Ministerium fuer Wirtschaft, Mittelstand und Verkehr, the authority of the provincial government of Nordrhein-Westfalen. Further development within the framework of this project aims at better results with the respect to efficiency and SO_2-emission in comparison to conventional power station technologies.

22913 **(BMFT-FB-T—79-135) Project study gas, tar and oil production by devolatilization of power station coal.** (Ruhrkohle A.G., Essen (Germany, F.R.); Ruhrgas A.G., Essen (Germany, F.R.); STEAG A.G., Essen (Germany, F.R.); Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Dec 1975. 391p. (In German). NTIS (US Sales Only), PC A17/MF A01. Order Number DE83750334.

Portions are illegible in microfiche products.

Commercial devolatilization plants based on the LR process may be designed for low or high-temperature operation. The main product, hot coke, can be used directly in power plants for the generation of electricity, in gasification plants for the production of synthesis, reducing and fuel gases, and in formed-coke plants for the production of blast furnace coke. Depending on the mode of operation of the devolatilization plant, liquid products (mainly tar) and fuel gases are obtained in different quantities. According to a market analysis made raw tar is a suitable feedstock for the production of high-grade products. The production price of the raw tar exceeds the present market price (in 1975).

22914 **(BMFT-FB-T—80-048) Optimization of combination of coal hydrogenation, Fischer-Tropsch synthesis and gasification for the production of motor fuels.** Imhausen, K.H.; Heger, N.; Eisenlohr, K.H.; Schnur, F.; Straetz, F.; Vinke, A.; Gaensslen, H.; Teggers, H.; Lenz, U.; Kirchhof, D. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Aug 1980. 52p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750344.

The target of the optimization study has been to find the combinations of coal hydrogenation, synthesis gas production and Fischer-Tropsch synthesis best suited to convert coal to liquid motor fuels.

22915 **(BMFT-FB-T—80-124) Catalysts and relations of selectivity for the Fischer-Tropsch-Synthesis.** Schulz, H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 129p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750367.

The chemical system of the Fischer-Tropsch-CO-Hydrogenation is characterized by a multiplicity of interconnected reactions. Various possibilities exist for shifting the selectivity of the process towards particular directions by means of varying the catalyst properties as well as the reaction conditions. As a basis for desired alterations of product selectivity the interrelations of selectivity in the Fischer-Tropsch system with cobalt and with iron catalysts are described as a function of temperature, synthesis gas composition, pressure, residence time and type of the process. An important role in this connection has to be attributed to analytical methods for determining product composition and to the characteristics of product selectivity (product distribution to fractions of same carbon number, methane formation, olefin portion of the hydrocarbons, olefin isomerization, skelatal isomerization, formation of alcohols). New interrelations and limitations of selectivity are evaluated in detail. The synthesis has been performed in fixed bed integral and differential type reactors. Additional experiments of propanol decomposition have been made for characterization of the catalysts. Methods of capillary gas chromatography, partly in combination with precolumns, have been developed. The results given in this report are regarded as to be of scientific value. They also offer a theoretical background for the proposed application of the Fischer-Tropsch synthesis for the production of industrial organic chemicals and other products.

22916 **(CONF-780611—17) Coal liquefaction in SYNTHOIL reactor without added catalyst.** Rogers, S.E.; Mazzocco, N.J.; Akhtar, S.; Yavorsky, P.M. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). 1978. 25p. NTIS, PC A02/MF A01. Order Number DE83008434.

From AIChE symposium; Philadelphia, PA, USA (4 Jun 1978).

The activity of the Co, Mo-on-alumina catalyst in a fixed-bed essentially completely decays within 300 hours of use in continuous coal hydroliquefaction. Operability of the fixed-bed liquefaction reactor system used here was not jeopardized by the decay of the catalyst. A fixed-bed reactor system, with turbulent upflow of reactants for vigorous mixing, is capable of long-term, reliable hydroliquefaction of coal without an added catalyst in the bed, as demonstrated by such a run of 1068 hour duration that produced acceptable fuel oil at high yield. Future work will determine if diminished turbulent mixing as obtained without fixed-bed packing is adequate to achieve similar hydroliquefaction results. This coal hydroliquefaction system is simple with a relatively short reaction time for high conversion to oil that is fluid at ambient or near-ambient temperatures. The product satisfies air-pollution restrictions on sulfur content. The product also has a high distillate content.

22917 **(CONF-790615—30) Overview of coal liquefaction in the US Department of Energy.** Lacey, J.J. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1979. 8p. NTIS, PC A02/MF A01. Order Number DE83008415.

From 3. US national congress on pressure vessels and piping; San Francisco, CA, USA (25 Jun 1979).

Processes for converting coal to synthetic liquid fuels are being improved so that clean fuels can be produced commercially. Emphasis is on the production of fuels for industrial and electric utility boilers and on synthetic crude oils for upgrading to liquids for transportation and home heating. Three processes, now in the pilot plant phase, are known as second-generation coal liquefaction processes, and include SRC, H-COAL and Donor Solvent Processes. DOE is supporting operation of the 50 T/D SRC pilot plant located at Ft. Lewis where the operating contractor is the Pittsburg and Midway Coal Mining Company. A 6 T/D SRC plant is operated in Wilsonville, Alabama by Southern Company Services, Incorporated, with support of DOE and EPRI. DOE and a consortium of industrial sponsors are supporting the design, construction, and operation of a 600 T/D H-COAL pilot plant at Catlettsburg, Kentucky. Responsibility for design of the plant is assigned to Hydrocarbon Research, Inc. Ashland Synthetic Fuels, Inc. will operate the plant. Under a cooperative agreement, DOE and Exxon Research and Engineering Company together with other industrial partners are supporting development of the Donor Solvent Process. A.G. McKee Co. is the engineering design and procurement contractor and Daniel Construction is the erection contractor for the 250 T/D pilot plant now under construction at Baytown, Texas. The Cresap Test Facility in cresap, West Virginia, has been placed in operation to evaluate liquefaction processes. The operating contractor is Liquefied Coal Development Corporation, a subsidiary of Fluor Engineers and Constructors, Inc. Third-generation processes are being funded since they offer significant potential improvements over second-generation processes. The Rocketdyne Division of Rockwell International is developing the technology for Partial Liquefaction by Direct Hydrogenation (Flash Liquefaction).

22918 **(CONF-8205167—1) Transportation fuels from indirect coal liquefaction.** Schehl, R.R. (USDOE Pittsburgh Energy Technology Center, PA). 1982. 10p. NTIS, PC A02/MF A01. Order Number DE83008431.

From Governor's conference on expanding the use of coal in New York State: problems and issues; Albany, NY, USA (21 May 1982).

Portions are illegible in microfiche products.

Coal can be converted to liquid fuels via three generically defined technologies: pyrolysis, direct hydroliquefaction, and indirect liquefaction. This paper presents a general overview of the indirect liquefaction technology and a discussion of processes tht are commercially available as well as those in the development stage. Finally, the objective of the DOE research and development program in conversion of synthesis gas derived from coal to transportation fuels is summarized. The current outlook for indirect liquefaction is encouraging. New facilities are being built in South Africe and New Zealand, and commercial plants could be designed and built for operation in the United States using proven technology. At the same time, developments in gasification as well as liquefaction catalysts and reactor technology promise significant improvements in indirect liquefaction processes in the years to come.

22919 **(DOE/ET/10069—T6) EDS-coal-liquefaction process development. Phase IV. Construction of Exxon Coal-Liquefaction Pilot Plant. Final report.** (Exxon Research and Engineering Co., Florham Park, NJ (USA)). Mar 1981. Contract FC05-77ET10069. 159p. (FE—2893-66). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83009157.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The 250 T/D Exxon Coal Liquefaction Pilot Plant (ECLP), located on a 70 acre site adjacent to Exxon USA's refinery in Baytown, Texas, was erected as part of the process development program, and this final report covers the activities associated with the project management, engineering/procurement, construction, and preparation for operations of the pilot plant. The EDS Process Development Program covers the period January 1, 1977 through December 31, 1982. Funding is shared by US Department of Energy, Exxon Company, USA (a division of Exxon Corporation), Electric Power Research Institute, Japan Coal Liquefaction Development Company, Phillips Coal Company, ARCO Coal Company, Ruhrkohle AG, and Agip, S.p.A. The EDS Process Development Program is an integrated program which also includes bench scale research, small pilot unit operation, and engineering design and technology studies which support operation of ECLP. The research and development studies and project execution activities related to ECLP have been reported in regularly issued EDS Technical progress reports available through the US Department of Energy Technical Information Center. These reports are listed in Attachment 2 on page viii.

22920 **(DOE/ET/10159—T24) Handbook of gasifiers and gas-treatment systems.** Parekh, R.D. (UOP/SDC, Joint Venture, McLean, VA (USA)). Sep 1982. Contract AC01-78ET10159. 268p. NTIS, PC A12/MF A01. Order Number DE83004846.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In February 1976, the Energy Research and Development Administration (ERDA) published the Handbook of Gasifiers and Gas Treatment Systems. The intent of this handbook was to provide a ready reference to systems that are or may be applicable to coal conversion technology. That handbook was well received by users and was subsequently reprinted many times. The Department of Energy (successor agency to the ERDA) expands, revises and updates the Handbook in this volume. This new Handbook is not intended as a comparative evaluation, but rather as an impartial reference on recent and current technology. The Handbook now presents 39 gasification technologies and 40 gas processing systems that are or may be applicable to coal conversion technology. The information presented has been approved or supplied by the particular licensor/developer.

22921 **(DOE/ET/12103—T5) Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980.** Schwager, I. (Filtrol Corp., Los Angeles, CA (USA)). Oct 1980. Contract AC22-78ET12103. 38p. (FE—2595-7). NTIS, PC A03/MF A01. Order Number DE83008236.

Portions are illegible in microfiche products.

Sixty exploratory cracking catalysts formulated with exchanged Y-zeolites, synthetic montmorillonite mica, and various matrix binder components have been activity tested (900°F and 1000°F, 16 WHSV, 3 Cat./Oil) on SRC-II Fuel Oil Blend (hydrotreated to 11.0 wt. % hydrogen). To date maximum corrected conversions of 70 wt. %, and C_5-EP gasoline product distribution of 50 wt. % have been obtained at 900°F with catalysts composed of various matrix binder components, and final catalyst rare earth concentrations of $\approx$ 5 wt. %. Bifunctional hydrocracking catalysts containing reduced noble metal hydrogenating components, and a low sodium ultrastable Y-zeolite cracking base formulated into extrudates with γ-alumina have proved active with hydrotreated SRC-II Fuel Oil Blend (11.6 wt. % hydrogen, 0.10 wt. % nitrogen, 0.03 wt. % sulfur). Corrected conversion and C_5-EP gasoline product ranged from 62 and 55 wt. % respectively at 8 hours reaction time, to 46 and 51 wt. % respectively after 16 hrs. reaction time with the above described platinum metal catalyst, (reaction conditions: temperature 750°F; H_2 flow rate, 5000 SCF/bbl; LHSV, 1 ml oil/ml cat-hr; H_2 pressure, 1000 psig). Alumina and silica-alumina catalysts impregnated with MoO_3/NiO and the additional promoters P_2O_5, ZnO and MnO were activity tested (same conditions as above) for HDN and HDS with the as is SRC-II Fuel Oil Blend. The most active catalyst, 100% Kaiser SA promoted with P_2O_5 afforded, 85% HDN, and 96% HDS after 24 hours on stream. The complete series of metal substituted SMM catalysts, impregnated with MoO_3, and compounded with 33 wt. % Kaiser SA alumina to improve their porosity, has now been activity tested as above. The results indicate maximum HDN activity of 60-62% with MoO_3 on Ni-substituted SMM, and maximum HDS of 91-92% with MoO_3 on Co-substituted SMM.

22922 **(DOE/ET/14759—T14) Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant. Final report.** (Grace (W.R.) and Co., Memphis, TN (USA). Agricultural Chemicals Group). Feb 1983. Contract FC02-80ET14759. 246p. NTIS, PC A11/MF A01. Order Number DE83008235.

Portions are illegible in microfiche products.

The information presented in this volume is intended as a guide and reference source to the more detailed information contained in specific project deliverables. Each task discussion includes a listing of the deliverables which have been submitted to DOE as documentation of specific contractual requirements and briefly describes the scope of information presented in the deliverables. Appendix 4 to this report is a listing of the deliverables prepared and the dates of submission of each deliverable. In reviewing this Final Report it should be remembered that Tasks 1 through 9 documented work on the 50,000 BPD plant, Task 11 covered all aspects of the 12,500 BPD plant and Task 10 was applicable to management and control of all work performed under the CA.

22923 **(DOE/LC/RI—83-2) Depositional environments, subsurface stratigraphy, and post-burn characterization of the Paleocene-Eocene Hanna Formation at the Hanna, Wyoming underground coal-gasification site: Hanna II Phase 1 experiment.** Youngberg, A.D.; McClurg, J.E.; Schmitt, J.G. (Department of Energy, Laramie, WY (USA). Laramie Energy Technology Center). Feb 1983. 166p. NTIS, PC A08/MF A01. Order Number DE83005592.

Portions are illegible in microfiche products.

During the summer of 1981, the Laramie Energy Technology Center conducted a post-burn coring program at the Hanna II, Phase 1, Underground Coal Gasification site, Hanna, Wyoming. Detailed geologic studies were conducted on the altered and unaltered overburden as well as an analysis of the burn cavity. The overburden consists of about 80 meters of Paleocene-Eocene Hanna formation above the Hanna No. 1 coal bed used in the burn. The overburden contains three basic lithologic units: Unit A consists of very fine-grained sandstones, siltstones, and claystones deposited as a lacustrine delta. Unit A is immediately above the Hanna No. 1 coal. Unit B is above Unit A and consists of carbonaceous shales and mudstones containing isolated lenticular and tabular sandstone bodies deposited in a meandering fluvial system. Unit C is above Unit B and contains coarse-grained sandstones and conglomerates deposited in a braided river system. The Hanna No. 1 coal bed ac-

cumulated in a poorly drained swamp that was subject to clastic flooding from an adjacent fluvial system. A reactor cavity 26m x 16m x 15m was formed during the Hanna II, Phase 1 burn and partially filled with rubble and three types of pyrometamorphic rock: paralava, paralava breccia, and buchite. The lithology, thickness, and lateral continuity of Unit A had a definite influence on the success of the experiment as the growth of the reactor cavity was contained completely within the unit. Temperatures up to 1200°C were reached during the UCG test.

22924 **(DOE/MC/14600—T1) Coal-feeder development. First quarterly technical progress report, October-December 1980.** Mistry, D.K. (Ingersoll-Rand Research, Inc., Princeton, NJ (USA)). Jan 1981. Contract AC21-80MC14600. 33p. NTIS, PC A03/MF A01. Order Number DE83007206.

The pilot-scale piston feeder development is progressing satisfactorily and should proceed as planned. The bench-scale testing of components, subsystem and critical areas is providing very useful information in support of the development of the complete feeder. Therefore, the components development facility will be upgraded and testing at the bench-scale level will be heavily emphasized. Other seal system approaches such as hard rings will be investigated. The upgrading of the pilot-scale feeder and its system will be continued to perform feeder capabilities and limitations testing. The 5.5″ diameter pilot-scale screw feeder has been delivered to DOE-METC and is available for evaluation with the METC 42″ gas-producer pilot plant. Emphasis should be placed on installing this feeder on the specially built structure near the 42″ gas producer.

22925 **(DOE/MC/16528—1328) Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report.** Neufeld, R.D.; Paladino, J.; Moretti, C.; Plautz, M.; Ali, F. (Pittsburgh Univ., PA (USA). Dept. of Civil Engineering). 1 Dec 1982. Contract AC21-81MC16528. 173p. NTIS, PC A08/MF A01. Order Number DE83005594.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This (second) year of effort examined the roll of solvent extraction, ozonation, and carbon adsorption for incorporation into the wastewater treatment scheme for purposes of enhancing process stability, decolorization, elimination of dilution water requirements, and minimization of nonbiodegradable residuals. This approach, while more costly, will better allow for direct discharge or reuse of gasification wastewaters. Di-isopropylether (DIPE) and methyl-isobutyl ketone (MIBK) were incorporated into a pretreatment step with free and fixed ammonia stripping followed by activated sludge treatment. Solvent extraction did not result in a decrease of nonbiodegradable residuals from the bioreactor, but did result in a highly stable operation of the bioreactors with no dilution water requirements and a minimal tendency for foaming and biodeflocculation. Ozonation of biofeed resulted in phenol being kinetically favored for oxidation. Ozonation of bioeffluents resulted in decolorization of wastewaters at low dosages, and first order kinetics in the reduction of nonbiodegradable TOC residuals. Steam stripping for ammonia removals, coupled with an understanding of anion/cation chemistry, led to a treatment system with minimization of salt additions. This is desirable if waste-waters are to be concentrated via evaporative techniques for partial reuse. Use of ozone followed by activated carbon further reduces nondegradable organics as may be desired for discharge or reuse purposes.

22926 **(DOE/NBM—3008233) Conductivity probe and data acquisition for a liquefaction cold model.** Fuchs, W.; Smith, D. (USDOE Pittsburgh Energy Technology Center, PA). 1981. 15p. NTIS, PC A02/MF A01. Order Number DE83008233.

A device has deen developed to measure local bubble size and velocity of the gas-phase in a three-phase slurry bubble column operated at coal liquefaction flow conditions. An in situ electrical conductivity twin probe (0.3-cm gap) detects the difference in conductivity of the gas and slurry phases. The analog signal from each probe is rapidly digitized and stored on a waveform recorder and subsequently transmitted and analyzed on a minicomputer. Measured bubble length and velocity are computed from the measured response time interval between probes and the dwell time of a bubble on each probe. A probabilistic model is used to derive actual bubble sizes and velocities.

22927 **(DOE/NBM—3008433) Supercritical gas extraction to separate liquefied coal from residual solids.** Rogers, S.; Madden, R.; Akhtar, S.; Yavorsky, P.M. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). [nd]. 4p. NTIS, PC A02/MF A01. Order Number DE83008433.

The objective is to determine the feasibility of using supercritical gas extraction techniques to cleanly extract the pentane-soluble oil and asphaltene fractions from raw coal liquids and/or recovery of the adsorbed oil from centrifuge residue cake. A 1 lb/h semicontinuous unit is currently being used to determine how effectively the oils and asphaltenes can be separated from the gross liquid and from centrifuge residue produced from an on-site 1/4 TPD coal liquefaction unit. A fixed quantity of the substrate material, raw oil or centrifuge residue, is contacted with a stream of supercritical gas slightly above its critical temperature and at 2000 to 4000 psig. The extract laden gas is depressurized into a separation vessel causing the gas to lose its solvent power and the extract to precipitate out. The solvent gas is then condensed separately into a solvent recovery vessel for recycle. Any remaining light hydrocarbon gases produced during the extraction are metered and analyzed by gas chromatography. Isopropanol, benzene and toluene have been tested as supercritical solvents at 250, 300 and 350°C respectively, applied to both gross liquid and centrifuged residue substrates. Supercritical gas extraction was found to be extremely effective for separation and recovery of liquefied coal away from the unconverted residue and ash; it is more efficient and clean-cut than centrifuging, filtration or settling. Typical results presented.

22928 **(DOE/NBM—3008435) Proposal for research on heat transfer and hydrodynamics in preheaters for direct coal-liquefaction processes.** (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 22 Feb 1980. 58p. NTIS, PC A04/MF A01. Order Number DE83008435.

Portions are illegible in microfiche products.

An apparatus for measuring heat transfer coefficients and lfuid friction factors (pressure drops) in a coal liquefaction preheater test section of pilot plant scale is proposed. The preheater test section consists of two 20-ft lengths of 1.1-in. I.D. tubes connected by a U-bend. The apparatus employs a high throughput slurry recirculation loop that allows high mass velocities through the test section with modest fresh slurry feed rate. The unit will be operable at 2000 psig up to a temperature of 450°C. It will be capable of operation with mixed phase superficial velocities in excess of 30 ft/s. A 36 month program for design, construction and operation of the apparatus is proposed. It culminates in a test matrix that spans slurry coal feed concentrations of 25 to 40 wt %; mixed phase superficial velocities (mesured at 100°C) of 5 to 20 ft/s; and hydrogen to coal ratios of 15 to 55 MSCF per ton. The test matrix covers the expected design conditions for the SRC-I and SRC-II demonstration plants.

22929 **(DOE/PC/40089—T2) Investigation of pulsation in slurry-pumping systems in coal-liquefaction plants. Final report.** McKee, R.J. (Southwest Research Inst., San Antonio, TX (USA). Applied Physics Div.). 10 Mar 1983. Contract AC22-81PC40089. 325p. NTIS MF A01. Order Number DE83009226.

Microfiche only, copy does not permit paper copy reproduction.

This investigation was conducted to measure pulsations in coal slurries at two pilot plants and to develop techniques for controlling pulsations when designing full-scale liquefaction units. Field measurements were made of the pressure pulsations, pump performance, cavitation signals, and acoustic velocities. The data was analyzed for pump efficiencies, effects of valve action, pulsation levels, resonant frequencies, mode shapes, cavitation limits, and speed of sound values. Calculations of the acoustic velocities were made from thermophysical data. Simulations of the two field installations were conducted with a dynamic acoustic analog which duplicated the pulsation behavior measured in the field. Pulsation-control ar-

rangements were evaluated. This study verified that the dynamic acoustic analog simulator can accurately represent the pulsation interactions of a coal-slurry-pumping system and can evaluate and design pulsation-control measures. Acoustic velocities for mixtures of coal slurries can be predicted adequately. Pump efficiencies were judged to be adequate for future use. Controlling suction pulsations will improve cavitation limits. Continued experience with pulsations in slurry-pumping systems should expand and refine the technology of pulsation control for liquefaction applications. The design procedures that should be used to control pulsations in a slurry-pumping system are given.

22930 **(EGG-FM—6187) Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres.** Smolik, G.R. (EG and G Idaho, Inc., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 44p. NTIS, PC A03/MF A01. Order Number DE83009191.

Causes for failures in pressurized tubes of alloys in high temperature simulated coal gasification atmospheres (CGAs) were investigated. A particular objective was to investigate the influences of cyclic loading. Throttling valves were used in a 6.89 MPa test system to vary the magnitude of cyclic loads. A limited number of scoping tests were performed to determine lifetimes, defined as time for perforation. Metallography was also performed to identify reactant products and damage associated with corrosion and cracking present in tube specimens. The data indicated reductions of lifetime in air for two alloys, Incoloy 800H and Haynes 188. Severe corrosion occurred in three alloys exposed in simulated CGAs. This severe corrosion and inadequate control of cyclic loading variables prevents a quantitative assessment of relative influences of biaxial stress and cyclic loading upon enhanced corrosion. These observations have prompted changes which will provide better control of test variables to allow further investigation of influences of strain upon the behavior of biaxially loaded tubes in simulated CGAs. 16 figures, 3 tables.

22931 **(EPRI-AP—2846) Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report.** Darling, S.L.; Koucky, R.W.; Tanca, M.C. (Combustion Engineering, Inc., Windsor, CT (USA)). Feb 1983. Contract AC01-76ET10204. 393p. NTIS, PC A17/MF A01. Order Number DE83009252.

Portions are illegible in microfiche products.

A program was conducted to design, construct and operate a two-stage, atmospheric-pressure, entrained-flow, low-Btu coal-gasification-process development unit (PDU) having a capacity of 5 tons/h of coal. The program was jointly sponsored by the US Department of Energy, the Electric Power Research Institute, and Combustion Engineering, Inc. The objectives of the program were: (1) to demonstrate the capability and suitability of the process and equipment to produce a clean-low-Btu gas from coal, and (2) to provide design information for scale-up to commercial-size plants. During the 3-y PDU test program, beginning in June 1978, a series of 12 runs was conducted. Pittsburgh seam coal was fired for 5085 h and clean fuel gas was produced for 3746 h. Product-gas higher heating values above 100 Btu/scf were observed during initial testing when gasifier thick-wall refractory was intact. However, refractory thickness decreased, causing higher vessel heat absorption and hence lower gas temperatures. Lower-than-design gasification kinetics for Pittsburgh seam coal char and higher-than-design vessel heat absorption resulted in lower char-gasification rates and decreased gas-heating values. As a result, when the gasifier was operated at the design feed rate of 10,000 lb/h, char inventory was not in balance and gas-heating values were generally less than 100 Btu/scf (averaging 80 Btu/scf). Several equipment and operating problems were identified, including poor refractory durability, char-feed-system limitations and slag tap blockage. A mathematical model was developed to provide a basis for scale-up to commercial-size gasifiers. The model was calibrated using experimental data from the PDU tests and bench-scale support studies. The major process concepts and gasifier design features were demonstrated in tests at reduced coal feed rates.

22932 **(ICTIS/M—0148) Optimum conditions (technical and economic) for steel industry coke.** Gomez Saenz-Messia, J. (Instituto Mexicano de Investigaciones Siderurgicas, Saltillo). 1981. 23p. (In Spanish). (CONF-8109202—). Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico.

From 1. international symposium on coal; Ixtapa, Mexico (7 Sep 1981).

This paper covers the research and experiences of ENSIDESA (the Spanish steel undertakings) in their study and preparation of coal blends which will yield blast furnace coke (with the correct technical specifications) at minimum cost. Since 1974, when coal prices soared, the industry has been examining methods of keeping costs down by using cheaper coal of poorer quality to produce good blast furnace coke. The article takes stock of their findings to date and contains sections on blend homogenization, study of optimum size consist, a mathematical model for blend optimisation, the use of additives (inert, coal tar, petroleum tar, oils and others) management and control of coke oven batteries and preheating of the coal charge. Concludes by looking at new techniques of the future, in which coal of poorer grades produces the requisite quality of blast furnace coke. (11 refs.) (Available from IEA Coal Research, quoting ICTIS/M0148).

22933 **(ICTIS/M—0149) Recent developments in blast furnace coke production.** Beck, K.G. (Instituto Mexicano de Investigaciones Siderurgicas, Saltillo). 1981. 22p. (CONF-8109202—). Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico.

From 1. international symposium on coal; Ixtapa, Mexico (7 Sep 1981).

Various projects directed towards the improvement of coke oven performance, carried out by the German Coal Mining Association in conjunction with four German coke oven engineering companies, are described. They involve: testing of a silica-coke oven with thinner liners and matching headers, development of an improved regenerator brick with increased specific heat-exchange surface; and the Precarbon process for preheating and charging of preheated coal. A brief section considers possible consequences of these studies on the steel industries of South America. (11 refs.) (Available from IEA Coal Research, quoting ICTIS/M0149).

22934 **(ICTIS/M—0150) World developments in coal liquefaction processes and how these developments could affect South American coal owning nations.** Cooke, N.E.; Mikhlin, J.A.; Ashraf, F.A.; Dhawan, J.C. (Instituto Mexicano de Investigaciones Siderurgicas, Saltillo). 1981. 37p. (CONF-8109202—). Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico.

From 1. international symposium on coal; Ixtapa, Mexico (7 Sep 1981).

The paper begins by describing the historical development of coal liquefaction. Studies at SNC Inc. in Canada aimed at technically assessing seven of the most promising coal liquefaction processes are then presented. The processes studied were: H-coal; SRC-II; Exxon donor solvent process; IG Farben-Bergius; Dow liquefaction; CS/R flash hydropyrolysis; and supercritical gas extraction. Several processes being developed by the NCB in Britain are also outlined. (5 refs.) (Available from IEA Coal Research, quoting ICTIS/M0150).

22935 **(ICTIS/TR—20) Hydropyrolysis of coal.** Furfari, S. (IEA Coal Research, London (UK). Technical Information Service). Oct 1982. 82p. IEA Coal Research, Technical Information Service, London, England.

This review represents a critical study of the main papers published on the hydropyrolysis of coal. The results are analysed with respect to the different methods of pyrolysis (fixed bed, fluidized bed, entrained bed, heating by Joule effect) and the process variables. The effect of the main parameters of hydropyrolysis are critically discussed. This analysis indicates that the published results, while they all point to the interest being shown in this new method of coal treatment, are, however, not entirely consistent. This appears to be due to the fact that certain important factors have been overlooked. More intensive, systematic research is required, for a number of basic problems have yet to be resolved. (107 refs.)

22936 (SAND—82-2495) Oil-soluble coal-liquefaction catalyst screening. Kottenstette, R.J. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 24p. NTIS, PC A02/MF A01. Order Number DE83009216.

Experiments were performed to determine the effect of oil-soluble catalysts in direct coal liquefaction. Variables included the metal type (Mo, Co, Ni, Mn and Sn), metal loading (0.01 to 1.0 wt %) and organic ligand (octoic and naphthenic acids). All runs were carried out with Illinois No. 6 coal (Burning Star mine) and SRC-II heavy distillate solvent at 400°C for 30 min. under 800 psig (cold) H_2. Statistical analysis showed that for Mo and Ni, hydrogen consumption and conversion to oil increased with increasing metal concentration. For example, conversion to oil increased from 15.7% without catalyst to 28.5% with addition of 0.1% Mo naphthenate and 26.0% with addition of 0.1% Ni naphthenate. The effect of ligand type on catalyst activity was insignificant, indicating tht neither of the organic acids were influential for coal liquefaction. Oil-soluble catalysts containing Co, Mn and Sn had no significant effect upon coal liquefaction, within the concentration range studied. 6 figures, 5 tables.

22937 Electrochemical studies of coal slurry oxidation mechanisms. Dhooge, P.M.; Stilwell, D.E.; Park, S.M. (Univ of NM, Albuquerque, USA). *Journal of the Electrochemical Society;* **129**: No. 8, 1719-1724(Aug 1982).

Oxidation of a coal slurry solution at platinum electrodes in strong acidic media has been studied in detail. The results indicate that the iron ions leached out from coal are responsible for major anodic currents. The Fe(II) is electrolytically oxidized to Fe(III) at the anode, which oxidizes coal to various products including CO_2. The rate constants for the catalytic reaction are determined to be $3.0*10^{-5}$ and $1.1*10^{-4}$ sec^{-1} for Fe(III) and Ce(IV), respectively. The activation energy for the processes are 13.3 and 7.0 kcal/mol for Fe(III) and Ce(IV). Current efficiencies for CO_2 production are approximately 15-30%. 6 refs.

22938 Thermal/strain history effects on creep of refractory concrete. Bray, D.J.; Smyth, J.R.; McGee, T.D. (Iowa State Univ, Ames, USA). *Journal of the American Ceramic Society;* **65**: No. 6, 275-280(Jun 1982).

The present investigation is a continuation of the study of steady-state creep of refractory concretes. It was conducted to extend the analysis by considering the effects of thermal/strain history during initial heating and during initial creep. The ultimate goal is to improve the understanding of the creep behavior, including the creep mechanism of these materials. This knowledge can be used to develop new materials of this type with specific creep behavior. 21 refs.

22939 Thermomechanical behavior of refractory concrete linings. Buyukozturk, O.; Tseng, T. (MIT, Cambridge, USA). *Journal of the American Ceramic Society;* **65**: No. 6, 301-307(Jun 1982).

A numerical analysis model was developed for predicting the behavior of dual-component, refractory-lined coal-gasification vessels. The temperature-dependent constitutive law, failure criteria, creep behavior, thermal expansion-contraction behavior, and shrinkage characteristics of refractory concrete were formulated. To verify the proposed model, a three-dimensional simulation analysis was made of an experimental gasifier vessel. 15 refs.

22940 Underground coal gasification product quality parameters. Bruggink, P.R.; Davis, B.E. (Gulf Res and Dev Co). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* 1-10(1981). (CONF-811023—).

A simplified model is described which will indicate the economic value of the raw product gas from an experimental underground coal gasification test on a real-time basis in order to aid in the optimization of the process during the course of the test. The model relates the properties of the product gas and the injection gas to the cost of producing each of five potential commercial products. This model was utilized to evaluate data during the Gulf-DOE underground coal gasification test at Rawlins, Wyoming in the fall of 1981. 6 refs.

0105 By-products

REFER ALSO TO CITATION(S) 22903, 22906, 22913, 22921

0106 Properties

REFER ALSO TO CITATION(S) 22911, 22916, 22928, 22937, 22992, 22994, 22995, 22998, 23236

22941 (BCRA-CRR—95) Moisture determination by microwave heating. (British Carbonization Research Association, Chesterfield). Dec 1981. 17p. British Carbonization Research Association, Chesterfield.

Samples of coal, lignite, coal slurry and cokes were heated in a microwave oven and the loss of moisture was studied in relation to the time of heating and the rate of power-supply. Comparisons were made between these results and those obtained by existing standard methods. Rapid drying of solid fuels can be achieved by microwave heating, but the removal of the last traces of water presents difficulties, owing to local overheating of the sample. Provided that some means can be devised for monitoring the drying operation, it is considered that moisture values could be obtained within reasonable limits of the corresponding values determined by normal laboratory methods. It is suggested that the technique would be useful for the rapid drying of certain materials under field conditions, e.g. wet slurries, where an absolute moisture value would not be essential. (4 refs.)

22942 (ICTIS/M—0146) The effect of oxidation on the microhardness and plastic properties of Guasare coal. Hoyer, M. (Instituto Mexicano de Investigaciones Siderurgicas, Saltillo). 1981. 22p. (In Spanish). (CONF-8109202—). Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico.

From 1. international symposium on coal; Ixtapa, Mexico (7 Sep 1981).

A detailed study is presented of the high-volatile, bituminous coal of the Guasare region, Venezuela, which is mainly used to provide coke for the steel industry. The paper studies the well-known adverse effects of oxidation on coking coal quality. This research was undertaken to evaluate the effects of oxidation on the plastic properties (Ruhr dilatometry and F.S.I.) and on microhardness (Vickers test) of coal from the Guasare coalfield. At the same time, the author tries to establish the usefulness of the above parameters in monitoring the oxidation process. In order to simulate oxidation the different types of coal were heated to different temperatures and for varying periods of time. (15 refs.) (Available from IEA Coal Research, quoting ICTIS/M0146).

0108 Waste Management

REFER ALSO TO CITATION(S) 22925, 22958, 23910, 24241

22943 (BMFT-FB-T—79-90) Process for removing sulfur oxides from gases with direct production of a usable finished reaction product. Mohn, U. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 25p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750317.

Portions are illegible in microfiche products.

Under the project, pretests were performed on a laboratory scale and a pilot plant for 20,000 m^3/h at normal conditions was built and operated to prove that a process conceived by Messrs. Walther for removing sulfur oxides from gases is feasible from a technical point of view. The process works with gaseous ammonia additions. The sulfur oxides are absorbed in a scrubbing process. Concentration of the scrubbing liquid is increased to a salinity level close to the saturation point. Then the scrubbing liquid is fed into an oxidation facility and finally spray-dried in a hot flue-gas current. The resulting product is separated as dry ammonia sulfate powder in an electrostatic precipitator. In test runs excellent results have been achieved with the process which offers the following particular advantages: 1. Low cost of desulfurization, 2. the end product can be directly used, 3. the end product is available dry

without application of external heat, 4. no external heat is required for reheating of the cleaned gases, 5. no waste water is produced during the process, 6. hence a process has been introduced into the market which, as compared with other known processes for desulfurizing flue gases, offers considerable ecological and economical advantages.

22944 **(BMFT-FB-T—80-112) Investigation of the use of coal-waste as raw-material for the production of aluminium.** Kuehn, L.; Schieder, T.; Belsky, M.; Lotze, J.; Winkhaus, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 56p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750363.

Portions are illegible in microfiche products.

The inevitably large quantities of wastes from coal mining in the Federal Republic of Germany represent an increasing dumping problem. However, these wastes (on the average 25% Al_2O_3) represent an important domestic raw-material potential for the aluminium industry. During the study reliable data were collected on the occurrence and composition of wastes from major coal mining areas of the FRG. The behavior of wastes on extraction with acids was investigated. Possible use of residual silica is shown. Basic process concepts for the extraction of alumina from the wastes exist using experience gained in the processing of kaolinitic clays. However, their transfer to a technical scale requires further development. Due to economic reasons this investigation is not intended to be continued at the present. Knowledge obtained during this study may be used in future investigation.

22945 **(CONF-810319—4) Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration.** Demski, R.J.; Yeh, J.T.; Joubert, J.I. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). [nd]. 14p. NTIS, PC A02/MF A01. Order Number DE83008221.

From 3. symposium on the transfer and utilization of particulate control technology; Orlando, FL, USA (9 Mar 1981).

Experimental programs carried out at the Pittsburgh Energy Technology Center (PETC) have demonstrated that fabric-filtration systems are effective in controlling emissions of a number of pollutants resulting from the combustion of bituminous coal in boilers. In studies conducted in a 500 lb/hr coal-fired furnace equipped with a baghouse, it was found that the baghouse filter cake removed significant portions of the toxic trace elements mercury, selenium, arsenic, beryllium, lead, and cadmium. When operating the baghouse in combination with injection of dry sorbents such as nahcolite, trona, and sodium bicarbonate, approximately 95% removal of sulfur dioxide and chlorine was obtained. In this paper, the previously reported study relating to control of trace elements is summarized. Emphasis is placed on the recently completed investigation of SO_2 control by dry sorbent injection. In the latter study, tests were conducted with coals ranging in sulfur content from 1 to 3 percent. Operating variables considered included baghouse temperature, baghouse cleaning cycle time, sorbent particle size, and the ratio of sorbent to sulfur. With the exception of baghouse cleaning cycle rate, each parameter had a significant effect on SO_2 removal. 3 figures, 3 tables.

22946 **(CONF-820627—14) Start-up and performance of a high-sulfur dry-scrubber system.** Farber, P.S. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83007624.

From 75. annual meeting on the Air Pollution Control Association; New Orleans, LA, USA (20 Jun 1982).

Portions are illegible in microfiche products.

This report describes the pollution control equipment installed at the Argonne Steam Plant. The control equipment, for particulates and SO_2, was required so that the Laboratory could burn high sulfur mid-western coal. It consists of a lime based spray-dryer fabric filter system. Startup was in November, 1981. Performance tests included both inlet and outlet particulate and SO_2 measurements. Based on the results of the initial performance tests, it appears that emission rates are low. Further testing is planned. (DMC)

22947 **(CONF-821008—3) Electrostatically augmented gas-cleanup devices for particular removal.** Henry, R.F.; Podolski, W.F.; Saxena, S.C. (Illinois Univ., Chicago (USA). Dept. of Energy Engineering; Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83008758.

From IEEE annual meeting of the Industry Applications Society; San Francisco, CA, USA (4 Oct 1982).

Increased use of coal as an energy source and strict regulation of environmental emissions have resulted in increased interest in gas-streams cleanup. Particulate control is also of great importance for turbine protection in the pressurized fluidized-bed combustion/combined cycle (PFBC/CC) concept for generation of electricity. Many types of particulate-removal devices are commerically available for relatively moderate temperature and near ambient pressure -- efforts to electrostatically augment performance of several of these devices are reviewed, with special attention to potential for use at the high-temperature, high-pressure conditions existing in the PFBC/CC scheme. Inparticular, electrostatic precipitators, electrostatically augmented cyclone separators, fabric and granular bed filters have been considered. 6 figures, 1 table.

22948 **(CONF-830218—1) Solid waste management at fossil plants.** Poston, J.E. (Tennessee Valley Authority, Chattanooga (USA)). 1983. 26p. NTIS, PC A03/MF A01. Order Number DE83901684.

From American Public Power Association engineering and operations workshop; San Antonio, TX, USA (14 Feb 1983).

Portions are illegible in microfiche products.

An overview of waste management options at fossil-fuel power plants is presented. Discussed are: modes of conveyance and methods for disposal of fly ash, bottom ash and pyrite, wet bottom slags, and scrubber sludge. Specific examples are given from TVA coal burning power plants. (DMC)

22949 **(CONF-7804203—1) Kinetics of anaerobic decomposition of phenol.** Mack, J.D.; Neufeld, R.D.; Strakey, J.P. (USDOE Pittsburgh Energy Technology Center, PA; Pittsburgh Univ., PA (USA). Dept. of Civil Engineering). 1978. 31p. NTIS, PC A03/MF A01. Order Number DE83008418.

From ASCE spring meeting; Pittsburgh, PA, USA (24 Apr 1978).

Portions are illegible in microfiche products.

The feasibility for using mesophilic anaerobic digestion for the treatment of phenolic waste water is examined in this report. The anaerobic decomposition by mixed organisms is feasible and represents an alternative wastewater treatment process. A mathematical model is derived to represent specific phenol utilization. This model indicates a maximum specific utilization rate at a phenol level of 700 neg/l, with process instability occurring at phenol levels in excess of this value. Growth yield coefficients were found to be 0.82 lb VSS/lb phenol and decay coefficients were 0.00827 day^{-1} for non-inhibited anaerobic microorganisms. A biological solids retention time of at least 30 days is necessary for stable anaerobic phenol degradation. Methane is not produced in these experiments. The resulting products of anaerobic biosynthesis are more amenable to aerobic biological treatment and thus produce a higher overall treatment efficiency. (DMC)

22950 **(DOE/ET/10143—T35) Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater.** Churton, B.M. (Ashland Synthetic Fuels, Inc., KY (USA)). Dec 1982. Contract AC05-76ET10143. 97p. NTIS MF A01. Order Number DE83006713.

Microfiche only, copy does not permit paper copy reproduction.

As part of an overall environmental evaluation of the H-COAL liquefaction process, sour water treatability studies have been performed: H-COAL Sour and Stripped Water Characterization Study; Zimpro's Biophysical Treatability and Characterization Study on H-COAL Wastewater; Zimpro's Biophysical Treatment System Stress Testing of the H-COAL Wastewater; Zimpro's Biophysical Treatment and Wet Air Regeneration System Engineering Study for H-COAL Wastewater; Engineering Analysis of Reuse Concepts for Treated H-COAL Wastewater; and Evaluation of Reverse Osmosis Treatment of Treated H-COAL Wastewater. These

studies indicate that H-COAL Sour Water can be successfully treated for reuse or for discharge to public waters. The PACT studies utilizing Powered Activated Carbon Treatment achieved the following results: Five-day Biochemical Oxygen Demand (BOD_5) removal > 98.8%; chemical Oxygen Demand (COD) removal 85 to 87%; Essentially complete nitrification; Phenolics removal greater than 99%; Priority Pollutants removal to levels below Environmental Protection Agency defined detection limits; PACT operated well using wet air regenerated carbon; and Carbon recovery of ~ 90% in the wet air regeneration step. The first step in the Zimpro studies was a bench scale study to evaluate the feasibility of biophysical treatment, demonstrate the nitrification step, estimate the expected effluent quality, obtain preliminary data on solids retention time, hydraulic detention time, carbon dosage, volatile solids production, biological oxygen requirements, and neutralization requirements. The second step was also a bench scale evaluation: Further develop and define information produced in the first step; evaluate effects of varying carbon dosages upon treatment performance; and perform stress test to evaluate the treatment system's response to anticipated upstream upset conditions. The results of this second Zimpro study are presented here.

22951 **(DOE/ET/10143—T36) Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater.** Churton, B.M. (Ashland Synthetic Fuels, Inc., KY (USA)). Dec 1982. Contract AC05-76ET10143. 121p. NTIS, PC A06/MF A01. Order Number DE83006712.

Portions are illegible in microfiche products.

As part of an overall environmental evaluation of the H-COAL liquefaction process, sour water treatability studies have been performed. These studies consisted of the following major components: H-COAL sour and stripped water characterization study; Zimpro's biophysical treatability and characterization study on H-COAL Wastwater; Zimpro's biophysical treatment system stress testing; Zimpro's biophysical treatment and wet air regeneration system engineering study; engineering analysis of reuse concepts for treated H-COAL wastewater; and evaluation of reverse osmosis treatment of treated H-COAL wastewater. These studies indicate that H-COAL Sour Water can be successfully treated for reuse or for discharge to public waters. Zimpro performed the first three studies on the biophysical treatment utilizing Powdered Activated Carbon Treatment (PACT). The PACT studies achieved the following results: Five-day biochemical oxygen demand (BOD_5) removal was > 98.8%; chemical oxygen demand (COD) removal was 85 to 87%; esentailly complete nitrification was achieved; phenolics removal was > 99%; priority pollutants were removed to levels below Environmental Protection Agency (EPA) defined detection limits; PACT operated well using wet air regenerated carbon; and carbon recovery was ~ 90% in the wet air regeneration step. The third step in the Zimpro studies was a larger scale pilot investigation to: Confirm information developed in bench-scale experiments on a larger scale; provide performance data necessary to evaluate the PACTs Wet Air Regeneration System; optimize PACT operating conditions; produce treatment wastewater for additional testing; and perform a stress test at elevated concentrations of cyanide and thiocyanate. The results of the third Zimpro study are presented here.

22952 **(DOE/METC/SP—194) Advanced environmental control technology .** (USDOE Morgantown Energy Technology Center, WV). May 1982. 53p. NTIS, PC A04/MF A01. Order Number DE83009222.

To develop the technology base needed to control detrimental contaminants during coal utilization and conversion, the Department of Energy (DOE) established the Advanced Environmental Control Technology (AECT) Program in 1979. This program consolidated cleanup efforts in ongoing technology-specific programs (such as combustion and gasification) with new projects initiated in a coordinated program that addresses cleanup technology development. The strategy of the AECT program is to develop flue gas cleanup, hot gas stream cleanup, process modifications, and associated waste management techniques that will permit the conversion of existing utility or industrial energy systems to coal use or for the siting of new facilities. In addition, applied research, systems analysis, and instrumentation studies are included to support the main program thrust and to determine optimum combinations of control technologies and power systems components. A brief description of the projects within the three areas of AECT program is given and includes accomplishments to date.

22953 **(DOE/NBM—3008220) Simultaneous removal of SO_2 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process.** Demski, R.J.; Gasior, S.J.; Bauer, E.R. Jr.; Yeh, J.T.; Strakey, J.P.; Joubert, J.I. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1982. 28p. NTIS MF A01. Order Number DE83008220.

Microfiche only, copy does not permit paper copy reproduction.

An experimental program carried out at the Pittsburgh Energy Technology Center (PETC) has demonstrated that a fluidized bed of copper-impregnated laumina spheres can simultaneously remove 90% of the SO_2 and NO/sub x/ from a simulated flue gas when ammonia is injected into the flue gas upstream of the fluidized bed. The tests were conducted in a 6-inch (0.15-m)-diameter vessel at 400°C, employing bed heights of 18 inches (0.46 m) and 36 inches (0.91 m). Following most of the sorption tests, the sorbent was regenerated in a fixed-bed reactor at 440°C using methane; two regeneration tests were also conducted using syngas ($2CO/H_2$). No loss in sorbent activity was obeerved after 56 absorption and 56 regeneration tests. Attrition of the sorvent ranged from 0.024% to 0.32% of the sorvent fed or 0.031% to 0.042% of the fluidized-bed inventory per hour. 7 figures.

22954 **(DOE/NBM—3008425) DOE's electron-beam-irradiation development program.** Trexler, E.C. (Department of Energy, Washington, DC (USA)). 1982. 17p. NTIS, PC A02/MF A01. Order Number DE83008425.

Portions are illegible in microfiche products.

The Department of Energy's (DOE's) electron-beam irradiation development program activities are conducted as part of the Advanced Environmental Control Technology (AECT) Program which is managed within the organization of the Assistant Secretary for Fossil Energy. The AECT program supports the development of cleanup systems to economically meet future emission limits so that the industrial and utility sectors can burn coal, which is abundant, rather than to burn premium fuels which are not. The electron beam (E-Beam) development program seeks to promote the development of systems for the simultaneous removal of NO/sub x/, SO/sub x/, and particulates from such flue gas streams. Electrons pass through a thin window into the flue gas causing the conversion of gaseous NO/sub x/ and SO/sub x/ into new sulfur and nitrogen particulate compounds which are then removed by conventional means. The Primary R and D activities within DOE's program involve two jointly funded efforts with Avco-Everett/EBARA and Research-Cottrell. The High Voltage Engineering Corporation plays a prominent role as a subcontractor in both efforts. The Avoc-Everett effort involves the testing of a configuration which utilizes ammonia injection upstream of the reactor and which produces a dry fertilizer by-product. The Research-Cottrell effort involves the testing of a configuration which utilizes a lime spray dryer upstream of the reactor and which produces a landfill waste product. An additional DOE E-Beam effort is being conducted at Florida State University where the use of electron irradiation for particulate precharging is being evaluated. 9 figures.

22955 **(EPRI-EA—2867) Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report.** Gehrs, C.W. (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 164p. NTIS, PC A08/MF A01. Order Number DE83009255.

Portions are illegible in microfiche products.

Comparisons of the physical and chemical properties of solid wastes from coal combustion and gasification processes should assist in deciding whether gasification solid wastes can be utilized or disposed of in the same manner as combustion solid wastes. In this study, solid wastes from a pilot scale (150 Mg/d) entrained flow coal gasifier (Combustion Engineering) were compared with solid wastes from two conventional coal-fired power plants, a pulverized coal boiler, and a cyclone boiler. All three facilities were firing a common feedstock, Pittsburgh seam coal from West Virginia. Solid wastes were characterized with respect to composition,

mineralogy, selected physical properties (e.g., morphology, particle size, specific surface area, hydraulic conductivity) and leaching behavior (batch and column extraction). Slag from the gasifier and slag from the cyclone boiler were physically and chemically similar, both wastes exhibiting low leachability and rates of leaching of inorganic toxic constituents. In contrast, combustion fly ash exhibited relatively high leachability of certain toxic elements (e.g., Cd). The results of this study generally suggest that entrained flow coal gasification, with char recycle and by-product elemental sulfur recovery, should not require solid waste management practices different from those currently used for coal combustion solid wastes. The absence of a fly ash-like waste and production of sulfur in a potentially marketable form appear to offer environmental advantages over conventional coal combustion.

22956 **(ICTIS/M—0147) Upgrading of waste material from coal washeries.** Zavala Rodriguez, P. (Instituto Mexicano de Investigaciones Siderurgicas, Saltillo). 1981. 9p. (In Spanish). (CONF-8109202—). Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico.

From 1. international symposium on coal; Ixtapa, Mexico (7 Sep 1981).

Washed coal from the Coahuila Region of Mexico is used to provide coke for the steel industry. As a result of the washing process and the required ash content, the material discarded from all washeries in the region contains carbonaceous material worth recovering. This material forms the subject of this study. The paper covers location of the washeries, statistical data on run-of-mine, coal washed coal and washery discard. Describes the method of treating the waste material (screening, weathering process plus application of an alkaline solution to aid separation of coal and shale). According to the tests conducted, 51,000 tons of coal with 40 to 45% ash content can be recovered per month. (Available from IEA Coal Research, quoting ICTIS/M0147).

22957 **(PB—83-148379) Effect of trace metals and sulfite oxidation of adipic acid degradation in FGD systems. Final report Dec 81-May 82.** Jarvis, J.B.; Terry, J.C.; Schubert, S.A.; Utley, B.L. (Radian Corp., Austin, TX (USA)). Dec 1982. 186p. NTIS, PC A09/MF A01.

The report gives results of the measurement of the adipic acid degradation rate in a bench-scale flue gas desulfurization (FGD) system, designed to simulate many of the important aspects of full-scale FGD systems. Results show that the adipic acid degradation rate depends on the sulfite oxidation rate, the adipic acid concentration, the presence of manganese in solution, and temperature. The degradation rate is also affected by pH, but only when manganese is present. Adipic acid degradation products identified in the liquid phase include valeric, butyric, propionic, succinic, and glutaric acids. When manganese was present, the predominant degradation products were succinic and glutaric acids. Analysis of solids from the bench scale tests shows large concentrations of coprecipitated adipic acid in low oxidation sulfite solids. By contrast, low quantities of coprecipitated adipic acid were found in high oxidation gypsum solids.

0109 Environmental Aspects

REFER ALSO TO CITATION(S) 22955, 23224, 23232, 23233, 23234, 23235, 24259, 24290, 24302, 24454

22958 **(EPRI-CS—2885) Measurements of POM emissions from coal-fired utility boilers. Final report.** Sonnichsen, T.W. (KVB, Inc., Irvine, CA (USA)). Feb 1983. 158p. NTIS, PC A08/MF A01. Order Number DE83901861.

Portions are illegible in microfiche products.

Emissions of polycyclic organic matter (POM) from fossil-fuel combustion systems are of concern due to the potential carcinogenic activity of specific POM species. The initial objectives of this research program were to (1) conduct a limited laboratory verification of state-of-the-art POM sampling and analysis techniques for pulverized coal-fired combustion exhausts and (2) measure the POM emissions of up to four coal-fired utility boilers. Initial laboratory tests, involving the injection of synthetic POM tracers into the sampling and analytical procedures were capable of accurate POM measurements. However, subsequent tracer recovery results and measurements of combustion generated POM from a coal-fired laboratory test furnace and a utility boiler were highly erratic. The program was consequently redirected to include a comprehensive evaluation of the analytical techniques and interfering factors in the flue gas or sampling train that may have impacted the POM measurements. State-of-the-art GC/MS analytical technical techniques were shown to be generally adequate, but some questions remain concerning sample preparation and adaptability for routine measurements. Review of the literature identified the potential for interaction of POM with the fly ash in either the flue-gas stream or the sampling system. The results of these evaluations were incorporated into a final field-test program on a coal-fired utility boiler. While some improvement in tracer recoveries and combustion-generated POM were obtained, several inconsistencies in the data were still apparent. Recommendations for future POM-measurement programs on utility boilers are presented.

22959 **(ICTIS/M—0155) Determination of environment parameters for SELPE, a model for energy supply.** (Stichting Energieonderzoek Centrum Nederland, Petten). Mar 1982. 51p. (In Dutch). Stichting Energieonderzoek Centrum Nederland, Petten.

Energy Study Centre, a division of the Energy Research Foundation, developed SELPE, a calculation model for the Dutch energy supply. This model enables the calculation of the total emission of air pollutants, based on the input of several energy carriers (coal, natural gas, oil). It is necessary to determine the so-called emission coefficients, i.e. the quantity of the emitted air pollutant in relation to the quantity of the energy flow from one energy carrier. The emission data and the expected input are given for the following subsectors: gas, oil, coal, electricity generation, district heating, industry, households, transport. Results are compared with data obtained earlier by the Dutch Central Bureau of Statistical Data (CBS). Significant differences appear between both calculations, but it is possible to indicate the causes (different definitions, different suppositions of sulfur content of fuels. (10 tables, 24 refs.) Available from IEA Coal Research, quote ICTIS/M0155.

22960 **(NMERDI—2-68-3118) Effect of underground coal gasification on groundwater. Final report.** Walters, E.A.; Niemczyk, T.M. (New Mexico Univ., Albuquerque (USA). Dept. of Chemistry). Feb 1983. 133p. New Mexico Energy Research and Development Inst., 117 Richmond Dr., NE, Albuquerque, NM 87106. Order Number DE83901528.

The potential effect of underground coal gasification (UCG) on groundwater has been examined in a combined field and laboratory study. The study was directed at Fruitland Formation subbituminous coal of the San Juan Basin and at the groundwater found in this coal seam. A field site for a possible UCG tests was selected and two wells were drilled into the coal seam which lies about 500 ft. below the surface. Groundwater samples were collected and used to establish baseline features. Core samples of overburden, underburden and coal were used for baseline characterization of the minerals. A number of static leaching and sorption studies were performed. Overburden was leached by both acidic and basic water. This material acts as a strong buffer, holding the water at a high pH. The amounts of Cl^- and F^- leached from overburden are about 10 ppM and show little dependence on the pH of the leaching solution. Ash prepared at several different temperatures has been generated and results of some leaching studies are reported. The amount of ash dissolved depends upon the ionic strength of the leaching solution in addition to pH. Predominant species dissolved are calcium, aluminum, sulfate, hydroxide and carbonate. Cations of the trace elements Be, Al, Cr, Mn, Fe, Co, Ni, Cu, Zn, Cd, Hg and Pb and the anions F^-, AsO_4^{-3}, SeO_3^{-2}, and MoO_4^{-2} were selected for coal sorption studies. Total sorptive capacities of raw and demineralized coal indicate that coal minerals account for about 95% of the sorptive capacity of metal ions while the carbonaceous matter accounts for only about 5%. Phenol adsorption by clay, raw coal and demineralized coal was studied. Phenol adsorbs strongly to the carbonaceous matter and only slightly to the minerals. The analytical problem of silicon determination in complex matrices by graphite furnace atomic absorption spectroscopy techniques has been studied.

22961 (NRCC—18574) Polychlorinated dibenzo-p-dioxins: criteria for their effects on man and his environment. (National Research Council of Canada, Ottawa, Ontario). 1981. 251p. National Research Council of Canada, Ottawa, Ontario.

This paper considers input, sources and levels, persistence in the environment of polychlorinated dibenzo-p-dioxins; general toxicology; assessment of the toxicological criteria; and exposure in the Canadian environment. Combustion and chemical sources of polychlorinated dibenzo-p-dioxins are examined in detail; the 'trace chemistries of fire' hypothesis is described. Four studies dealing with the combustion products of coal are not considered sufficient to permit extrapolation to a reasonable conclusion; therefore coal-fired facilities need further study as a possible source of polychlorinated dibenzo-p-dioxins. (371 refs.)

22962 (PB—83-124586) Stream water quality in the coal region of Pennsylvania. General technical report. Dyer, K.L. (Forest Service, Broomall, PA (USA). Northeastern Forest Experiment Station). 1982. 185p. NTIS, PC A09/MF A01.

This report is a compilation of water quality data for 86 small streams sampled in 23 counties of Pennsylvania where coal is surface-mined. Twenty-nine of these streams drain unmined watersheds; 57 drain areas where coal has been surface-mined. Most of these streams were sampled at approximate monthly intervals. The water quality data from these streams are presented in this report and should help fill the need for data from small watersheds in Pennsylvania.

22963 (PB—83-124636) Stream water quality in the coal region of Alabama and Georgia. General technical report (final). Dyer, K.L. (Forest Service, Broomall, PA (USA). Northeastern Forest Experiment Station). 1982. 124p. NTIS, PC A06/MF A01.

The report includes data collected in 1977-79 from 20 small streams that drain unmined watersheds and 38 that drain areas where coal has been surface mined. Measurements include common ions, alkalinity, acidity, pH, 16 trace elements, 5 nitrogen and phosphorous species, specific conductance, suspended solids, turbidity, settleable matter, water temperature, and estimated discharge.

22964 (PB—83-144063) Surface mine reclamation for wildlife: a model reclamation plan for southern Appalachia. Final report. Fowler, D.K.; Turner, L.J.; Slaski, L.J. (Tennessee Valley Authority, Norris (USA). Div. of Land and Forest Resources). Jun 1981. 41p. NTIS, PC A03/MF A01.

A reclamation plan for use on surface coal mines in southern Appalachia is presented. Included are suggestions relative to the establishment of groundcover and trees on the mine site. Also included are suggestions relative to the retention of surface water on mine sites. All techniques mentioned in the plan benefit wildlife and will assist the operator in achieving bond release. This plan has been implemented cooperatively by TVA and the FWS on a mine site in Campbell County, Tennessee. The costs of reclaiming a coal surface mine in Campbell County, Tennessee to benefit wildlife are described. The reclamation plan implemented on the mine site was designed for forestry and wildlife.

22965 (PB—83-148221) Soil-depth requirements to reclaim surface-mined areas in the northern Great Plains. Open file report 29 Jul 76-8 Apr 82. Barth, R.C.; Martin, B.K. (Colorado School of Mines, Golden (USA). Research Inst.). Apr 1982. 192p. NTIS, PC A09/MF A01.

The objective of this research was to determine existing reclamation practices and measure reclamation success for surface coal mines in the Northern Great Plains, determine the optimum soil-depth requirements for grass production following surface mining, and determine plant uptake of nutrients and trace elements in reclamation situations. Fourteen field plots were established at active coal mines. A wedge was cut into spoil and backfilled with soil; soil depth ranged from zero to 152 cm over a linear distance of 15 m. Perennial grasses were planted in each plot and production was measured from 1978 to 1981.

0110 Reserves And Exploration

REFER ALSO TO CITATION(S) 23236

22966 (USGS/MAP/MF—1312) Geologic map and coal resources of the Thompson Creek area, Big Horn County, Montana. Mapel, W.J.; Griffith, J.K. (Geological Survey, Reston, VA (USA)). 1981. 44p. Geological Survey, Federal Center, Box 25286, Denver, CO 80225. Order Number DE83900477.

0120 Mining

REFER ALSO TO CITATION(S) 22984, 23009, 23075

22967 (ACIRL-PR—81-9) Investigations into monolithic pump packing as a means of underground roof support. Part B: field trials at South Bulli 'B' Mine and mathematical modelling. Rodwell, P.; Mikula, P.; Carruthers, J. (Australian Coal Industry Research Labs. Ltd., North Ryde). Sep 1981. 51p. Australian Coal Industry Research Labs. Ltd., North Ryde.

Results are presented of field trials carried out at South Bulli 'B' Mine at Bellambi, NSW, on the suitability and effectiveness of monolithic coal aggregate concrete pump packing for the support of gate roads in longwall mining. Mathematical modelling of the pack system is described. It provided a good correlation with the underground monitoring results. (2 refs.)

22968 (BMFT-FB-HA—79-22) Pilot working for the prevention of rock bumps in seam Wilhelm/Johann in Colliery Sachsen. Albert, K. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 49p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750340.

Portions are illegible in microfiche products.

3 Part Projects: 1. Destressing water infusion with wetting agents, 2. Rationalization of destressing drilling in faces with shield supports, 3. Early detection and installations for early warning and switching-off. Ad 1. a) Development for a transport system for water infusion liquids, manless from the surface down to the infusion hole, b) water infusion with a 30% $CaCl_2$ lye (4 to 6 litres/m^3 coal) prevents the development of critical stresses. Ad 2. a) Simultaneous use of 2 x 2 remotely controlled drilling machines (2 x 3 machines also possible); reduction of the drilling times per borehole by 70%, b) most important finding: a transmission of the criteria, applicable for test drilling, of dangerous stresses to destressing drilling is not possible. Ad 3. a) Trials underground of the geophones and devices for analysis, developed by WBK, including their ruther improvement up to their proper applicability underground, b) development of a switching-off mechanism which switches off the general power underground when seismic shocks occur, including admission of this switching-off mechanism by the Chief Mine Inspectorate of the Land Nordrhein-Westfalen.

22969 (BMFT-FB-HA—80-036) Reducing the basic emission of methane by advance drainage. Guntau, A. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Aug 1980. 28p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750350.

Portions are illegible in microfiche products.

It is generally know that methane containing-seams emit gas into the open workings, after having been opened up by roadways. This applies to gateroads up to distances of about 10 to 15 m from the roadsides. In order to induce larger seam sections, prior to the extraction of coal, artificially to the emission of gas, this areas must be perforated by the boreholes driven into the seams. The project concerned the drilling of relatively long boreholes, the tubing and sealing of boreholes and their connection to the gas mains. The boreholes were drilled in a distance of about 10 m, tubed, sealed and connected. At the maximum, 22% of the basic gas emission could be drained within a rather short standing time of the boreholes. The knowledge and experience obtaining during the sealing of boreholes and with the at present improved technique of drilling holes lead us

to believe that the success of advance drainage could be much greater during longer standing times of the boreholes.

22970 (BMFT-FB-HA—80-041) Development of noise-abatement aids in underground mining operations. Palecki, E.; Kluge, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Aug 1980. 32p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750349.

Portions are illegible in microfiche products.

Scraper chain conveyors used in mining reach noise levels up to 112 dB(A). The principal source of noise is the impact of the steel flights at the lateral steel guides and centre plates. Now, tests were carried out with flights coated with plastic. For coal mines, only synthestic caotchouc and anti-static PVC can be used for electro-static reasons and in order to avoid fires. The testing stand tests yielded for PVC, a too rapid wear and tear and, for synthetic caoutchouc, a lower wear and tear, but not acceptable high friction values. A reduction of the noises produced by scraper chain conveyors in coal mines cannot be realized with the plastics at present available on the market.

22971 (BMFT-FB-T—79-109) Development and integration of operational planning models for the coal mining industry in the Federal Republic of Germany (short title: Mining planning models). Meyer, A.G.; Redling, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 61p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750331.

The aim of the project was the supporting of routine planning work of mining companies and collieries by using EDP models. The work was executed by the headquarters divisions of three mining companies. The result consists in EDP models for evaluating surveying and geological aspects of deposits (including hardware, storage of plot-system), for project orientated planning of capacity and production (package of decision aids), for supporting the planning of technical and economic results of underground operations, for planning of production and sales by the company branch sectors using linear programming, for monitoring and control of underground operations (including hardware).

22972 (CONF-811132—2) Continuous haulage update. Mayercheck, W.D. (USDOE Pittsburgh Energy Technology Center, PA). 1981. 5p. NTIS, PC A02/MF A01. Order Number DE83008441.

From Fall meeting of the Society of Mining Engineers; Denver, CO, USA (18 Nov 1981).

Portions are illegible in microfiche products.

The benefits of continuous face haulage in underground continuous miner sections have long been recognized. These benefits include increased section production of coal and safety enhancements, and have been documented in some specific mine operations. Both private industry and the government continue to make technology improvements that will promote the greater use of continuous haulage in underground coal mines. Although the initial capital costs for continuous face haulage in some instances may be higher than batch-type transport, increases in shift production and productivity with continuous haulage shuld offset these costs. The goal is to increase shift production of coal and reduce operating and accident-related costs enough to justify the initial purchase and long term use of this technology. In some mining conditions, continuous face haulage may not be just an alternative to batch-type transport, but the only means by which some coal seams can be extracted. The overall goal of DOE is to increase average room-and-pillar miner production by up to 45% via continuous facehaulage. If reduced place-changing (RPC) mine plans can be employed via miner-bolter type schemes that mine break-to-break, a further section production improvement up to 27% is conceivable. Thus, the maximum combined impact of reliable continuous face haulage being used in RPC mine plans is to increase room-and-pillar miner production in thinner coal seams by almost 85% as compared to continuous miner/shuttle car units extracting about 20-feet (6.1 m) and then changing place. This ambitious goal can be achieved in the years ahead if progress continues to be made in these technological areas.

22973 (DOE/ET/14054—4) Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report. (McDonnell Douglas Electronics Co., St. Charles, MO (USA)). Sep 1982. Contract AC22-80ET14052. 67p. NTIS, PC A04/MF A01. Order Number DE83008460.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report describes equipment designed to improve the availability and productivity of large front end loaders used in surface mining operations. The equipment to be mounted on a front end loader includes an operator display/keypad, a microcomputer, machine sensors, and a signal conditioner. Safety and machine performance problems are displayed to the operator and a report is printed for the maintenance shop. The BITE equipment, machine environment, system operation, and evaluation tests are described.

22974 (DOE/ET/14236—1) Duty-cycle investigations of continuous miners. Volume I. Final technical report. Leech, M.C.; Fagan, J. (Lee-Norse Co., Belle Vernon, PA (USA); Ingersoll-Rand Research, Inc., Princeton, NJ (USA)). 20 Sep 1982. Contract AC01-79ET14236. 112p. NTIS, PC A06/MF A01. Order Number DE83005617.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A firm engineering data base of machine operating parameters for mining equipment has been lacking due to the problems associated with gathering that data. Environmental conditions, space restrictions, and electrical permissibility requirements have limited underground testing to a few rudimentary parameters that are easily accessible. This report describes a portable, intrinsically safe, battery-powered, instrumentation package that has been developed under a project sponsored by the US Department of Energy. The system consists of solid-state data-sampling recorders; a collection of force, pressure, distance, speed, and power measuring transducers; and a desk-top calculator programmed to reduce the data to quantities of engineering significance. The application of this instrumentation to a continuous miner is discussed in relation to coal cutting performance, mechanical component loads, and electrical motor operational parameters.

22975 (DOE/ET/14236—2) Duty-cycle investigations of continuous miners. Volume II. Instrument manual. Leech, M.C.; Fagan, J. (Lee-Norse Co., Belle Vernon, PA (USA); Ingersoll-Rand Research, Inc., Princeton, NJ (USA)). 25 Oct 1982. Contract AC01-79ET14236. 230p. NTIS, PC A11/MF A01. Order Number DE83005618.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A firm engineering data base of machine operating parameters for mining equipment has been lacking due to the problems associated with gathering that data. Environmental conditions, space restrictions, and electrical permissibility requirements have limited underground testing to a few rudimentary parameters that are easily accessible. This report describes a portable, intrinsically safe, battery-powered, instrumentation package that has been developed under a project sponsored by the US Department of Energy. The system consists of solid-state data-sampling recorders; a collection of force, pressure, distance, speed, and power measuring transducers; and a desk-top calculator programmed to reduce the data to quantities of engineering significance. The operation, installation, and calibration of this equipment is discussed in relation to the measurement of continuous minor operating parameters.

22976 (DOE/TIC—11478) Modern underground mining technologies for pitching coalbed extraction. Report No. 2. Survey of geological and mining conditions of highly inclined and steep coalbeds, and technologies of working (mining systems) in European coalfields. Szozurowski, A. (Glowny Inst. Gornictwa, Katowice (Poland)). Jan 1978. 288p. NTIS, PC A13/MF A01. Order Number DE83009203.

In European countries having a developed coal mining, 50 to 80% of coal is produced from integrated mechanized longwall faces in seams nearly flat irrespective of their thickness; the part of production from mechanized faces in pitching seams ranges from 2 to 5%, from partly mechanized faces/mechanical getting/ from 10 to 20%, and the remaining production is obtained without mechani-

zation. Therefore, the part of production from highly inclined and steep seams is incommensurably low as compared with the reserves of those seams and the productivity is low. In a number of countries, intensive work is under way on improvement of mining systems in highly inclined seams and on supports, getting machines and ancillary equipment/winches, anchoring stations, supports of junctions, etc. In spite of designing a number of prototypes, there are still no satisfactory solutions in this field. The information research and, particularly, on new prototype machines and equipment is limited and incomplete. They show only the lines of research work, but do not provide technological solutions. Nevertheless, there are many technologies of working highly inclined and steep seams in which relatively favorable production indices are attained. In this report prepared on the basis of the available literature and on reports on visiting foreign countries, methods of mining highly inclined and steep seams, actually in use, are presented. The description is limited to tested systems with relatively favorable production indices.

22977 **(DOE/TIC—11480) Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries.** (Glowny Inst. Gornictwa, Katowice (Poland)). Mar 1978. 41p. NTIS, PC A03. Order Number DE83009204.

Paper copy only, copy does not permit microfiche production. Original copy available until stock is exhausted.

On the basis of results of the study tour to the Federal Republic of Germany the following can be stated: (1) methane drainage has a long tradition in the coal mining industry of the FRG and the present state of degasification technology should be regarded as high. The level reached in the field of methane drainage by the western-Germany coal mining industry may, in principle, be considered representative for the coal mining industries of other western-European countries. The basic method of deposit degasification is the classical method of draining methane from strata and adjacent seams by means of boreholes; advance degasification of the mined seam is of minor importance. In the field of methane drainage the following particular technical achievements deserve mentioning: the linking of the applied degasification system with the ventilation system, taking into consideration the degree of methane hazard; the location of drainage boreholes on the basis of systematically conducted scientific-research work/above all the probing of methane drainage holes; gradual change-over of degasification stations to water-ring pumps; newest solutions of borehole sealing; and use of automatic flame extinguishers in degasification stations.

22978 **(DOE/TIC—11483) Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls.** Kidybinski, A. (Glowny Inst. Gornictwa, Katowice (Poland)). Dec 1977. 121p. NTIS, PC A06/MF A01. Order Number DE83009155.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The survey of methods presented in this report covers: tests and classifications of rocks with respect to their stability in underground workings, principles of selection of longwall-face supports adjusted to roof rocks and the classification of roofs for natural mining hazards evaluation. It is argued that tests on bed separation resistance of roof rocks are necessary for prediction of roof behavior at longwall faces. As rock resistance to falling due to gravity action is an important roof parameter, a method and apparatus were developed at the Central Mining Institute for detailed measurements of bed separation resistance. On account of the fact that in US coal mines the average roof rock strength is considered higher than in Polish mines, development of a penetrometer redesigned to work under high pressure conditions is fundamental. The range of the pressures required should be determined by preliminary measurements of rock strength in US coal mines.

22979 **(NP—3770032) Coal mining in the West German power industry in 1981.** (Statistik der Kohlenwirtschaft e.V., Essen (Germany, F.R.)). Sep 1982. 94p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83770032.

Tables are presented with figures on black coal mining, brown coal mining, coal balances, energy consumption, reserves, foreign trade and energy balances. World surveys in the appendix inform on coal, petroleum, and natural gas production, electric power and raw steel production - according to country and year.

22980 **(NP—3901402) Research on air sprays and unique foam-application methods. Phase II-B report: laboratory investigation of air sprays.** (Engineers International, Inc., Downers Grove, IL (USA)). Mar 1983. 33p. Bureau of Mines, Washington, DC. Order Number DE83901402.

This report presents the results of the laboratory investigation on the effectiveness of air sprays for dust control on longwall faces. The investigation was carried out on a simulated 100-foot-long, 6-foot-high longwall face using sulphur hexafluoride (SF_6) as a tracer gas to simulate respirable dust. All sampling was done at the shearer operator positions with the shearer oriented to cut against the airflow across the face. Detailed description of the laboratory longwall mockup and the investigative procedures that were used to evaluate the potential of the air sprays system are provided in this report. The results of this investigation reveal that the air spray system is quite effective, particularly at lower face velocities. The air sprays system currently installed in the laboratory has the capability to confine the dust cloud toward the face as well as cause dilution at the shearer operator positions. At face velocities, over 400 feet per minute (fpm), however, excessive turbulence around the shearer body and drums coupled with insufficient momentum transfer from the air sprays to the dust cloud, reduces the effectiveness of air sprays to the dust cloud, reduces the effectiveness of air sprays. Suggestions to improve system performance are included in this report. 25 figures, 4 tables.

22981 **(PB—83-125294) Relation of geology to mine roof conditions in the Pocahontas No. 3 coalbed. Information circular/1982.** Moebs, N.N.; Fern, J.C. (Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center). Mar 1982. 14p. NTIS, PC A02/MF A01.

Bureau of Mines studies of mine roof fall problems in the Pocahontas No. 3 Coalbed of southern West Virginia and southwestern Virginia have established that type and sequence of rock are significant factors in roof competence. The poorest conditions occur where the immediate roof consists of slump structures and slickensided rock. The best conditions occur where the roof consists of a sequence that coarsens upward from shale to massive sandy shale. A small manual of color photographs of rock types was devised to aid in identifying drill cores. Proper identifications should enhance the prediction of areas of potential roof problems in advance of mining.

0130 Transport And Handling

REFER ALSO TO CITATION(S) 22929, 22932, 22956

22982 **(BMFT-FB-T—80-049) Research on the fundamentals of process control in hard coal preparation.** Leininger, D.; Luedke, H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Aug 1980. 39p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750346.

The research activities on the fundamentals of process control in hard coal preparation are subdivided in following tasks: Development and testing of instantaneous measuring devices. Mathematical description of the process steps involved. Establishment of a simulation model. Structuring a computer-aided coal preparation system. Among the devices for instantaneous measurements of humidity, ash, and sulphur contained in coal, hitherto only the instantaneous measuring device for ash content has been commissioned and proved its suitability for certain applications. The simulation model of hard coal preparation was established and is suited for planning tasks. The replacement of process functions by comprehensive mathematical descriptions of processes and appertaining equipment has not yet been completed so that hitherto process control will be possible only in certain sections. In the framework of introducing a computer-aided coal preparation system, practical trials were carried out hitherto with regard to the control of proc-

esses appropriate for transforming intermediary preparation products into saleable products. The present state of development work both in the fields of process technology (mathematical description) as well as measuring technology (reliable instantaneous measuring devices) ist not yet sufficient for any process optimization.

22983 **(CONF-810814—13) Coal preparation for synfuels: where do we stand.** Killmeyer, R.P. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Mining Technology Center). 1981. 20p. NTIS, PC A02/MF A01. Order Number DE83008224.

From 91. national meeting of the American Institute of Chemical Engineers; Detroit, MI, USA (16 Aug 1981).

As the optimum-feedstock requirements for synfuels processes become more clearly defined, so will the role of coal preparation in the overall mine-to-fuel scheme. The extent of coal preparation needed will largely depend on the characteristics of the ROM coal, the process-feedstock specifications, and the overall economics of the system. It has been shown that coal cleaning can have a direct impact on the catalytic reactivity of the feedstock and the synfuel plant throughput on a raw-coal-feed basis. These parameters, in turn, affect the product quality and quantity, plant sizing and cost, hydrogen requirements, downstream processing steps, equipment life, and system economics. While the initial studies have indicated benefits to be gained from utilizing a cleaned coal as a feed stock, future investigations are needed to more quantitatively define the impacts of different coal preparation alternatives on parameters such as those mentioned above.

22984 **(DOE/ET/12188—1) Automated rail-haulage system. Final technical report as of November 30, 1982.** Mighdoll, P.; Skinner, C.S. (Booz, Allen and Hamilton, Inc., Cleveland, OH (USA)). Nov 1982. Contract AC22-77ET12188. 607p. NTIS, PC A99/MF A01. Order Number DE83006591.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Automated Rail Haulage System (ARHS) project was originally planned to culminate in the demonstration of a prototype system in an operating underground coal mine. However, program activities were suspended at the completion of the detailed design phase due to budgetary constraints within the government. This document was created primarily by assembling portions of interim phase reports due to a limitation of funds. Chapter 1 presents the background of the program and summarizes the technical accomplishments. Chapter 2 reviews state-of-the-art of automated rail technology in contrast to domestic underground haulage practices. Chapter 3 describes the overall operational strategy and control and architecture of the ARHS. Chapter 4 contains detailed descriptions of the major hardware and software modules of the system. Chapter 5 describes the design verification testing performed on key components and subsystems. Chapter 6 provides a summary of operational, economic and safety benefits anticipated with ARHS implementation. Further detailed information is contained in six appendices.

22985 **(DOE/NBM—3003138) Magnetite recovery in coal washing by high-gradient magnetic separation. Quarterly project status report, 13th quarter.** Kelland, D.R. (Massachusetts Inst. of Tech., Cambridge (USA). Francis Bitter National Magnet Lab.). 10 Nov 1982. Contract EX-76-A-01-2295-056. 8p. NTIS, PC A02/MF A01. Order Number DE83003138.

Portions are illegible in microfiche products.

This quarter we have made considerable progress on the list of specific experimental runs to be performed contained in the last report on August 10. To be specific, 19 out of 28 on that list for the present matrix have been performed with no more than one condition different than shown on the list. The reason for this difference is that the loading of recovered heavy mediums on the matrix has very often been higher than we predicted on the basis of the earlier batch work. In addition, 37 runs have been made to assess machine performance, correct problems or explore new ideas.

22986 **(DOE/NBM—3008227) Application of HGMS in coal preparation.** Hucko, R.E.; Maronde, C.P. (Department of Energy, Washington, DC (USA)). 1980. 16p. NTIS, PC A02. Order Number DE83008227.

Paper copy only, copy does not permit microfiche production.

High-gradient magnetic separation (HGMS) is a novel magnetic separation technique that can separate extremely small, weakly magnetic particles. Separation is accomplished by entrapping particles of positive magnetic susceptibility on a filamentary matrix material within a magnetized working volume. To date, the principal commercial application of HGMS has been for the purification of kaolin clay. During the past decade, many investigators have sought to apply this newly developed technology to the preparation of coal. Two principal applications have been proposed: (1) beneficiation of fine coal (that is, removal of mineral matter, including pyritic sulfur), and (2) recovery of magnetite from dense-medium circuits. This report summarizes the current status of these efforts, presents previously unreported results of DOE research in the aqueous beneficiation of fine coal, and discusses the authors' perspective on the role that HGMS may come to play in future coal preparation plants.

22987 **(DOE/PETC/TR—83/1) Dense-medium cycloning of fine coal at low specific gravities.** Killmeyer, R.P. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). Oct 1982. 19p. NTIS, PC A02/MF A01. Order Number DE83009250.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A series of 36 pilot plant tests was run to study the separation efficiency of dense-medium cyclones cleaning 9 mesh x 100 mesh (9m x 100m) coal at a specific gravity of separation of 1.30. The probable error achieved at average operating conditions was 0.029, which compares favorably with the performance of conventional cyclones cleaning coarser material at higher cut points. Over the experimental ranges studied, inlet pressure was found to have no significant effect on performance, whereas increasing coal concentration and decreasing particle size resulted in a decrease in performance efficiency.

22988 **(DOE/TIC—11476) Automation of the mud and water circulation process at coal-preparation plant - initial study.** Dobrzelecki, R.; Kaczmarczyk, J. (Glowny Inst. Gornictwa, Katowice (Poland)). 1980. 75p. NTIS, PC A05/MF A01. Order Number DE83009130.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The preliminary research program for working out an automatic control system for the water and slurry circuit at a typical Polish coal preparation plant is reported. At the water and slurry circuits of these plants, both in Poland and in the United States, there are installed individual devices for local control, but there is a lack, for the time being, of sufficient information about steady-state and dynamic characteristics of these circuits to work out a full automatic control system. Under the research problem to be taken up, it is planning to carry out a full research on a chosen typical water and slurry circuit as a controlled plant, and to work out an automatic control system based on the results of that research. The designed system is to be tested under laboratory conditions, and next under service conditions at a chosen Polish coal preparation plant. A correct operation of the whole water and slurry circuit, apart from the fulfillment of the requirements of individual processes, required a series of conditions ensuring proper co-operation of the individual processes and facilities to be satisfied. The suitable quantity and quality of the media being transported between the individual installations should be ensued by using right size storage and mixing tanks. One of the fundamental problems is to ensure a proper flow of the thickened flotation refuse faom a continuously-operating thickener to a filter-press operating in cycle. One ought to pay attention to the fact that dynamic properties of the storing and mixing tanks and interconnections between the individual facilities (great delays and time constants) reduce considerably the possibility of water and slurry circuit regulation.

22989 (ICTIS/M—0144) Current coal preparation research in the United States. Duerbrouck, A.W. (Instituto Mexicano de Investigaciones Siderurgicas, Saltillo). 1981. 23p. (CONF-8109202—). Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico.

From 1. international symposium on coal; Ixtapa, Mexico (7 Sep 1981).

Projects on coal preparation in the USA include work on: coal characterization; pyrite removal by high-gradient magnetic separation; the Otisca process; coal-pyrite flotation; flotation of ultra-fine coal; chemical desulfurization methods such as NASA/JPL low temperature chlorinolysis coal desulphurization process, and TRW Gravimelt process; the Lignipel process for lignite dewatering; dewatering of fine coal and refuse; and construction of coal preparation plant simulators. (23 refs.) (Available from IEA Coal Research, quoting ICTIS/M0144).

22990 (ICTIS/M—0145) World trends in coal preparation. Zimmerman, R.E. (Instituto Mexicano de Investigaciones Siderurgicas, Saltillo). 1981. 18p. (CONF-8109202—). Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico.

From 1. international symposium on coal; Ixtapa, Mexico (7 Sep 1981).

Types of preparation plants and equipment in current use are described, jigs; dense media coarse coal cleaning; dense media small coal cleaning; hydrocyclone cleaning of fine coal; froth flotation; cleaning of minus 0.5 mm coal by other methods; and other coal cleaning devices, are included. Ancillary plant equipment for crushing and screening and also classifiers, centrifugal dryers, other filters, and static thickeners are also described. (17 refs.) (Available from IEA Coal Research, quoting ICTIS/M0145).

22991 (IS—4766) Selective magnetic enhancement of pyrite in coal by dielectric heating. Bluhm, D.D. (Ames Lab., IA (USA)). Dec 1982. Contract W-7405-ENG-82. 157p. NTIS, PC A08/MF A01. Order Number DE83009345.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The objective of this project was to investigate the possibility of improving the magnetic separation of pyrite from coal by enhancing the magnetic susceptibility of pyrite in run-of-mine (ROM) coal through the use of dielectric heating. Separation of pyrite from coal would be facilitated by changing a portion of each pyrite particle to a more magnetic form. Initially a complete literature survey was performed on related types of high-gradient magnetic separators, iron-sulfur system transformations, and various coal pretreatments yielding magnetic enhancement of pyrite. The selective magnetic enhancement of pyrite in coal by dielectric heating was investigated theoretically and experimentally. The dielectric properties of a selection of coals and their pyritic fractions were measured at frequencies ranging from 1 MHz to 11.7 GHz and these results were used to calculate the theoretical heating that would be produced in these materials and their mixtures. The experimental treatment involved heating fractions and their mixtures at 27 and 2450 MHz. Preliminary results showed both limited agreement between theoretical and experimental heating, and that it is possible to selectively heat pyrite in coal. Additionally the data indicated an increase in the apparent mass susceptibility of dielectrically heated pyrite samples that is roughly proportional to the time and power of pretreatment. Magnetic susceptibility measurements were taken on all coal samples. Magnetic separation tests were performed on unheated and dielectrically heated ROM coal samples using an open-gradient magnetic separator. Dry magnetic separations, free-fall mode, of dielectrically heated ROM coal samples showed slight reductions of the percent total sulfur in the product at constant heating value recovery.

22992 (EPA—600/7-79-098b-Vol.2) Survey of coals treated by oxydesulfurization. Warzinski, R.P.; Ruether, J.A.; Friedman, S.; Steffgen, F.W. (USDOE Pittsburgh Energy Technology Center, PA). Apr 1979. 24p. (CONF-7809119—3). NTIS, PC A02/MF A01. Order Number DE83007323.

From EPA symposium on coal cleaning to achieve energy and environmental goals; Hollywood, FL, USA (11 Sep 1978).

Portions are illegible in microfiche products.

The feasibility of using only compressed air and water at elevated temperature to reduce the sulfur content of coal has been demonstrated in autoclave experimentation at the Pittsburgh Energy Technology Center for various coals from most of the major coal basins in the United States. This air/water oxydesulfurization consistently removes in excess of 90 percent of the pyritic sulfur and has the potential for reducing the organic sulfur content by up to 40 percent. The sulfur liberated from coal by this reaction is present in the aqueous effluent as dilute sulfuric acid which can be neutralized with limestone. Under certain reaction conditions pyrite forms a jarosite intermediate which reports as organic sulfur in chemical analysis. Extent of organic sulfur removal and loss of heating value increase with temperature in the range 170°-200°C.

0140 Combustion

REFER ALSO TO CITATION(S) 22961, 23415, 23416, 23424, 23765, 24148, 24150, 24151

22993 (ARL-TR—30, pp 59-109) Char combustion and utilization. Essenhigh, R.H. 1982. National Research Council of Canada, Halifax, Nova Scotia.

In Application of pyrolysis technology to the utilization of eastern Canadian coals.

The prospective use of char in boilers raises a number of questions regarding ignition, flame stabilization, flame temperatures and heat flux profiles, and burn-out. This paper reviews carbon combustion fundamentals. The plane char flame, ignition and extinction, particle reaction kinetics, and combustion times and burnout are considered. (60 refs.)

22994 (CONF-7911188—1) Comparative study of the combustion of alternate liquid fuels. Ekmann, J.M.; Mathur, M.P.; McCann, C.R.; Bienstock, D. (USDOE Pittsburgh Energy Technology Center, PA). 1979. 7p. NTIS, PC A02/MF A01. Order Number DE83008216.

From Fall technical meeting of the Eastern Section of the Combustion Institute; Atlanta, GA, USA (7 Nov 1979).

Portions are illegible in microfiche products.

Tests were conducted at the Pittsburgh Energy Technology Center on various alternate liquid fuels and then compared to an existing data base on No. 6 oil. The alternate fuels tested included 20% and 30% coal-oil mixture, two types of shale oil, and a blend of middle and high boiling SRC II distillates. The tests were conducted as parts of several independent programs; however, sufficient similarity was maintained throughout the tests to permit comparison between selected experiments in the area of boiler performance, particulate and nitrogen oxide emissions, and average flame optical properties. The tests were run in a 100 HP boiler instrumented to obtain complete data, information on flame characteristics, mass balances and particulate distributions in the combustion behavior of liquid fuels. Ultimate analyses of the fuels plus the higher heating value and the hydrogen-to-carbon atom ratio are presented in Table 1. Similar data are presented for the Pittsburgh seam coal used in preparation of the COM's, although no combustion tests were conducted on coal alone in this program. In general, all the fuels tested resulted in acceptable boiler performance. No major modifications were necessary to the burner, although combustion of the coal-oil mixtures did require some changes in the distribution of the combustion air. The No. 6 oil, 20% COM, and 30% COM required preheating prior to atomization. The two shale oils and the SRC II behaved much like No. 2 oil in the fuel train. Heat balances on the tests indicate no significant degradation in performance when utilizing the various fuels. The relationship between fuel type and flame optical properties is summarized in Table 2. The data are listed in order of decreasing radiance measured on the combustor axis, or, where test data are absent, by decreasing emissivity. 3 tables.

22995 (CONF-8103159—1) Advanced characterization of combustion and conversion feedstocks. Sanner, W.S. Jr.; Deurbrouck, A.W. (USDOE Pittsburgh Energy Technology Center, PA). 1981. 16p. NTIS, PC A02/MF A01. Order Number DE83008437.

From Coal testing conference; Lexington, KY, USA (2 Mar 1981).

Portions are illegible in microfiche products.

In this paper we discuss characterization of feedstock coals for steam generation and liquefaction. The discussions are divided into three areas: (1) general background information, (2) state-of-the-art coal characterization, and (3) projected needs for improved characterization and highlights of germane DOE research. An analysis scheme is suggested for predicting the slagging and fouling characteristics of a coal. Characterization of coal for liquefaction is directed toward relating physical, chemical, petrographic, and mineralogic properties to potential performance in a hydrogenation test in order to develop a useful predictive methodology.

22996 **(DOE/FC—1006) Review of low-rank-coal AFBC testing.** Goblirsch, G.M.; Mann, M. (Department of Energy, Grand Forks, ND (USA). Grand Forks Energy Technology Center; North Dakota Univ., Grand Forks (USA)). 1982. 14p. (CONF-821176—2). NTIS, PC A02/MF A01. Order Number DE83008573.

From International conference on combustion of tomorrow's fuels; Santa Barbara, CA, USA (8 Nov 1982).

Portions are illegible in microfiche products.

(1) The alkaline components of lignite and subbituminous coal ash aid in the retention of sulfur. Some low-rank coals do not require addition of limestone or other sorbents to meet NSPS standards for SO_2 emissions from AFBC systems. (2) The optimum AFBC temperature for sulfur retention by the inherent alkaline ash for low-rank coals is about 100°F lower than for bituminous-coals using limestone. (3) The combustion efficiency for low-rank coal in the GFETC combustor without recycle is very high in the range of 96.9 to 99.9 percent, and is higher than that obtained under similar conditions with bituminous coal. (4) Because of deposition of sulfation products and ash on the surface of initial bed particles, the average particle size increases with run time, and reduces the heat transfer coefficient. (5) Agglomeration of ash and/or bed materials can occur at AFBC conditions when firing high-sodium low-rank coals. Agglomeration can manifest itself in particle growth, clusters of bed grains, deposits on stationary surfaces, and massive solidification. (6) The amount and rate of agglomeration appear to be functions of the amount and form of the sodium, the availability of other ash components (e.g., silicon), the selection of initial bed material, and the operating temperature. (7) The emission of NO/sub x/ from the low-rank coal AFBC is principally dependent on the fuel bound nitrogen. (8) AFBC of low-rank coal can meet current NSPS for NO/sub x/ emissions. (9) NO/sub x/ formation in the GFETC 2.25 ft^2 AFBC appears to be independent of temperature.

22997 **(DOE/NBM—3008446) Coal-liquid mixture combustion tests in oil-designed boilers at CTEP.** (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). [nd]. 49p. NTIS, PC A03/MF A01. Order Number DE83008446.

Portions are illegible in microfiche products.

The alternate fuel studies at the Combustion Technology Division of the Pittsburth Energy Technology Center are listed. The objective of our research is to develop coal-liquid mixture retrofit technologies to reduce the consumption of oil and to promote coal utilization in existing oil-designed boilers. The programs include coal-oil mixture combustion, which was completed in the spring of this year. Solvent-refined coal (SRC-I) was burned in an oil-designed firetube boiler last year at PETC. At present, we are conducting coal-water and coal-methanol mixture combustion studies. We also plan to burn petroleum-coke/oil mixtures.

22998 **(DOE/NBM—3008447) Comments on the effect of coal-particle-size consist on furnace ash deposition.** Pan, Y.S.; Bellas, G.T.; Joubert, J.I. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1981. 18p. NTIS, PC A02/MF A01. Order Number DE83008447.

Attempts to explain the occurrence of fouling and slagging in coal-fired boilers have been based mainly on ash chemistry. In this paper the effect of coal-particle-size consists on ash deposition in a boiler fired with coal-oil mixtures is reported. The results may be interpreted from consideration of aerodynamic flow patterns in the furnace. 6 figures, 2 tables.

22999 **(DOE/PC/40265—6) Computational tools for pulverized-coal combustion. Sixth quarterly report, July 1982-September 1982.** Oberjohn, W.J.; Cornelius, D.K.; Fiveland, W.A. (Babcock and Wilcox Co., Alliance, OH (USA). Research and Development Div.). Jan 1983. Contract AC22-81PC40265. 40p. (ARC—5278). NTIS, PC A03/MF A01. Order Number DE83009312.

Portions are illegible in microfiche products.

The general objective is to develop and verify a computer code capable of modeling the major aspects of pulverized-coal combustion. The combustion model (COMO) consists of a number of relatively independent modules that represent the major processes involved in pulverized-coal combustion. The formulation and coding of the initial gas-phase turbulence, chemistry and radiation models have been completed. Test cases were run for the turbulence and radiation models, and good agreement was obtained with other analyses and with data, when available. COMO predictions for both swirling and nonswirling isothermal flow were compared to proprietary data and predictions and found to be in agreement. The discrete-ordinates radiation model was compared to both experimental data and other predictions, and very good agreement was achieved. Evaluation of the fast-kinetics micromixing model continued. The radiative properties of coal, char, and ash were defined, based on recommended values of the refractive indices. The definition of the solid-phase combustion evaluation run was completed and good agreement was obtained with predictions from a proprietary code based on similar models of the physics and chemistry. A nonswirling gas-phase combustion run was completed, and comparison to data and predictions available in the open literature was initiated. Coding of the solid-phase model has been completed and the individual models tested for consistency. The models were then combined to form an integrated solid-phase combustion model. The COMO predictions have been compared to Brigham Yound University's two-dimensional pulverized coal combustion model for a one-dimensional test case and good agreement was obtained.

23000 **(ICTIS/M—0156) Industrial fuel applications. Furnaces and dryers.** (Stichting Energieonderzoek Centrum Nederland, Petten). May 1982. 97p. (In Dutch). Stichting Energieonderzoek Centrum Nederland, Petten.

In preparation for a study of the industrial fuel consumption in relation to the temperature level, information for different energy and constructive aspects of the applied furnaces and dryers has been collected. Where possible is given, at which temperature the process takes place. In relation to the efforts towards an increase of the use of coal in industry, at the same time it has been investigated, which way coal could be burned in furnaces and dryers. A documentation of the different furnaces and dryers has been given. Available from IEA Coal Research, quote ICTIS/M0156.

0150 Marketing And Economics

REFER ALSO TO CITATION(S) 22909, 23037, 23696

23001 **(DOE/CS/30013—T7) Rate guide for residential No. 2 heating oil and coal for SOLCOST Data Bank cities.** Weir, S.B. (Alabama Univ., Huntsville (USA). Kenneth E. Johnson Environmental and Energy Center). Dec 1981. Contract FG01-79CS30013. 260p. NTIS, PC A12/MF A01. Order Number DE82014212.

No. 2 heating oil and coal are not used for residential heating as much as electricity and natural gas, but must be considered when analyzing energy costs in some areas of the United States. Some sections of the country, particularly the northeast, use heating oil as a primary heat source. Few homes are now using coal for heating, but coal is still available on a retail basis and its use may increase with improved technology and rising oil prices. Prices of these commodities are limited to residential rates. This document gives the prices for No. 2 heating oil and coal for each city in the SOLCOST Data Bank. The UAH research team has found that rates of those companies in the same city are relatively the same, therefore, only one company is represented. The name is shown so as not to misrepresent any other companies. The information shown represents the data as quoted by each company. This includes the basic rate, the taxes, and the delivery charge, if not included. The

minimum represents the minimum amount sold to any one customer. Calculations have been made to show cost per gallon of fuel oil, cost per ton of coal, cost for both commodities with taxes, and cost-per-million Btu. Efficiency factors are not considered. The reader must apply the efficiency factor pertinent to his particular furnace, stove, or fireplace. The UAH calculates taxes on the basis rate and does not add the delivery charge where it is not included. The Btu values used in converting to cost-per-million Btu are 136,000 Btu per gallon of No. 2 heating oil and 25,070 Btu for a ton of coal.

23002 **(DOE/EIA—0035(83/02)) Monthly energy review.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Feb 1983. 110p. NTIS, PC A06/MF A01. Order Number DE83008804.

This issue of the Monthly Energy Review contains preliminary energy summary data for 1982. A 4.3% decline in total energy consumption marked the third year in a row that domestic energy consumption fell. Decreases in the consumption of petroleum, natural gas, and coal contributed to the decline but were offset somewhat by increased use of hydroelectric and nuclear power. Because demand for energy was down, a lower level of imports was sufficient to meet US energy needs.

23003 **(DOE/EIA—0075(82/05)) Cost and quality of fuels for electric utility plants.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). May 1982. 69p. NTIS, PC A04/MF A01. Order Number DE83008015.

Portions are illegible in microfiche products.

Electric generating plants with a total combined capacity of 25 megawatts or greater received fossil fuels equivalent to 1.46 quadrillion British thermal units (Btu) in May 1982, of which 99.2% was for steam-electric generation. Measured by their total heat content, fossil-fuel receipts for steam-electric generation decreased 1.7% from April, and were 40.1% higher than May 1981. A historical comparison of the heat content of fossil fuels expressed in Btu for steam-electric units and the combination of peaking units and steam-electric units is tabulated. The total coal receipts at steam-electric units during the month of May increased to a level of 51.4 million short tons, 22.7 million short tons higher than shipments received during the coal strike month of May 1981. Oil receipts for steam-electric generation were 15.4 million barrels during May, 10.1 million barrels lower than shipments received in May of last year. Gas receipts at steam-electric units totaled 241.4 billion cubic feet (Bcf), 56.6 Bcf lower than last May's level. During May, the cost of coal at steam-electric units averaged 165.0 center per million Btu, 12.5% higher than the average cost a year ago. The average cost of all oil received at steam units was 492.2 cents per million Btu, 11.6% lower than the average cost of oil in May 1981. Steam-electric gas costs averaged 331.6 cents per million Btu, 17.3% higher than the May 1981 level.

23004 **(DOE/EIA—0118(81)) Coal production: 1981.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Dec 1982. 109p. NTIS, PC A06/MF A01. Order Number DE83008784.

Portions are illegible in microfiche products.

This report provides comprehensive information about coal production, number of mines, prices, productivity, employment, productive capacity, reserves, and stocks in the US. Highlights of the 1981 coal production and related data collected by the Energy Information Administration were: a 72-day strike by the United Mine Workers of America (UMWA) resulting in a 5.7 percent decline in days worked; a decline of 0.7 percent in total US coal production; an increase of 7.1 percent in the average mine price; an increase of 4.3 percent in the number of producing mines; an increase of 8.7 percent in productivity; and a slight increase (0.3 percent) in the average number of miners working daily.

23005 **(DOE/EIA—0121(82/3Q)) Quarterly coal report, July-September 1982.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jan 1983. 85p. NTIS, PC A05/MF A01. Order Number DE83008801.

This report provides comprehensive information about coal production, exports, imports, receipts, consumption, and stocks in the United States. This issue, the third, shows detailed quarterly data for July to September 1982, aggregated quarterly historical and projected data for 1980 through 1983, and aggregated annual historical and projected data for 1960 through 1990. A percent change column has been added to many of the tables as an aid in spotting significant changes from one year to another. The nation's continued economic slump was evident in coal statistics for the third quarter of 1982: coal production totaled 198.0 million short tons - the lowest non-strike quarterly production total in 3 years; coal stocks held by coal producers and distributors continued to accumulate, reaching an unprecedented 39.7 million short tons; coke production plummeted to the lowest quarterly level in 49 years; electric utility coal consumption declined for the second quarter in a row from the corresponding 1981 figures; coal consumption in the other industrial and residential and commercial sectors decreased 6.2 percent from the third quarter 1981 level; coal exports declined 25.7 percent from the third quarter 1981 level; and the average price of coal received by consumers declined in all sectors. The feature article is entitled, A Regional Analysis of Future US Coal Production.

23006 **(DOE/EIA—0363) Prospects for future world coal trade.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Dec 1982. 40p. NTIS, PC A03/MF A01. Order Number DE83008807.

In this report, the US participation in future world steam coal trade, during the 1985 to 2000 period, is analyzed using low-, mid-, and high-demand scenarios. Since the United States, historically, has been a major supplier of metallurgical coal, the structure of the metallurgical coal market is discussed. However, projections for metallurgical coal trade flows are not given, since world demand for metallurgical coal is not expected to grow significantly from current levels. This report discusses the structural and behavioral relationships governing supply and demand. Total US metallurgical and steam coal exports reached a record level of 113 million short tons in 1981, compared with 92 million short tons in 1980. Steam coal exports, which amounted to 45 million short tons in 1981 compared with 27 million short tons in 1980, accounted for almost all of the increase in total exports. The steam coal export projections for the period 1985 to 2000 show that the United States will continue to have a major role in world steam coal trade. Australia, South Africa, and Poland will continue to be the other major steam coal exporters. Potential interdependence in world steam coal trade among producers and consumers is discussed. The importance attached by coal importers to the diversification of their coal supplies reflects each country's overall dependence on foreign energy sources and coal's contribution to each country's sectorial energy requirements.Coal exporters, on the other hand, will seek assurance that future productive capacity will be in line with expectations of future steam coal demand. Growth in coal production may be constrained by a number of factors. Uncertainty about steam coal demand due to recession in the major importing regions, labor and political unrest in the exporting nations, as well as fluctuations in the terms of trade for alternate energy sources, will affect the future outlook for steam coal trade.

23007 **(LA—9661-MS) Modeling international steam-coal trade.** Kolstad, C.D.; Abbey, D.S.; Bivins, R.L. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 73p. NTIS, PC A04/MF A01. Order Number DE83008273.

This report documents the World Coal Trade Model, a mathematical model of international steam coal trade developed at the Los Alamos National Laboratory. The model is unique in that trade is assumed to be determined endogenously by the structure and conduct of the market; that is, the model is one of imperfect competition. A basic hypothesis of how the international steam coal market operates is that some producers and consumers manipulate the market. That hypothesis is tested using the model. The report presents a detailed review of the coal market and a review of the commodity trade literature. From this foundation, the structure of the model and its supporting data is fully documented. Preliminary results for several market structures are presented. A basic conclu-

sion of the report is that specific assumptions about market structure and conduct can qualitatively explain market performance. The report closes with a summary of critical research needs.

0160 Health And Safety

REFER ALSO TO CITATION(S) 24258, 24458

23008 **(BMFT-FB-HA—79-20) Development of a methane measuring equipment for several measuring points.** Herms, C.D. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Mar 1979. 32p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750341.

Portions are illegible in microfiche products.

Hitherto the CH_4 concentration in mine air has been monitored by separate gas samplers the energy supply of which is not intrinsically safe. The task is to provide an intrinsically safe measuring system which is operative also when higher gas concentrations are prevailing. The novel system is to allow, furthermore, more extended and more exact collecting of CH_4 concentrations in hazardous underground workings. The result of this development work is a methane measuring equipment including five or more measuring points and providing an intrinsically safe remote energy supply to the measuring heads, furthermore a safe energy- and signal transmission, a defined interface for adaptation of various types of signal receivers, and a module-structured process adaptation centre.

23009 **(PB—83-131102) Toward safer underground coal mines.** (National Academy of Sciences - National Research Council, Washington, DC (USA)). 1982. 207p. NTIS, PC A10/MF A01.

The primary cause of large differences in injury rates among major U.S. coal mining companies is the degree of management commitment to safety rather than physical, technical, or geographic factors. Smaller underground mines have proportionately more fatalities than do larger mines. These conclusions were based on a new analysis of nearly 40,000 fatalities and injuries that occurred in underground coal mines during 1978-1980. The report recommends that the federal government double the minimum training requirements for new miners and that coal industry associations regularly publish rankings by company of injury and fatality rates. The quality of training is important because younger miners are much more likely than more experienced miners to be involved in accidents. The disabling injury rate for miners aged 18-24 is three times higher than that for miners over age 45, and twice as high as that for miners aged 25-45.

23010 **(PB—83-139410) The Federal Coal Mine Health program in 1976. Annual report No. 7.** (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Aug 1978. 38p. (DHEW/PUB/NIOSH—78-168). NTIS, PC A03/MF A01.

The 1976 annual report of health activities under the Federal Coal Mine Health and Safety Act of 1969 is presented. Results of medical service programs, X-rays, and autopsies of miners are discussed by the Coal Mine Health Research Advisory Committee. Spirometry, detecting abnormalities, early detection, chemiluminescence, and animal research studies are discussed. Diesel engines, third round coal, coal mine sanitation, and safety research are other topics reviewed. 1976 contracts, agreements, and research grants are described. The authors conclude that new health standards are necessary.

23011 **(PB—83-140392) Industrial hygiene comprehensive survey, Cresap test facility, Cresap, West Virginia - a study of coal liquefaction processes. Final report.** (Enviro Control, Inc., Rockville, MD (USA)). May 1980. 87p. NTIS, PC A05/MF A01.

The comprehensive industrial hygiene survey of the Consol Synthetic Fuel process was conducted in April and May, 1979, at the Cresap, West Virginia, coal liquefaction pilot plant facility. The survey covered all process units and support facilities including the maintenance shop and plant laboratory. A total of 133 area and personal samples were taken at steady-state operations or representative operating conditions. Results indicate that the primary emissions of the process are the single-ring and two-ring aromatics. Measured levels for these compounds were in the parts-per-billion and microgram-per-cubic-meter range. At these concentrations the major hazard is expected to be PNA exposure. Toxicologic data indicate that the mixture of PNAs present in coal conversion processes could constitute a potential carcinogenic hazard.

02 PETROLEUM

0202 Geology And Exploration

REFER ALSO TO CITATION(S) 23049, 24189

23012 **(BMFT-FB-T—80-122) Development of a telemetry system for seismic application.** Edelmann, H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 39p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750369.

Advanced seismic surveys can only be made with multi-trace recording equipment. The problem of multi-trace recording can be solved with the aid of a telemetry system. The activities necessary to bring the system into operation are described. Application of the system in the field shows that the system meets the technical and operational demands. Surveys in different areas yield good results.

23013 **(DOE/EIA—0372/3) Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications.** Farmer, R.D. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Dec 1982. 93p. NTIS, PC A05/MF A01. Order Number DE83008786.

This user's guide has been prepared to serve as a first-level reference manual to aid the user both in designing scenarios to evaluate oil and gas supply from the Outer Continental Shelf (OCS) and in operating the computer programs that compose the OCS Oil and Gas Supply Model (OCSM). The economic and policy variables explicitly represented in OCSM that are of most common interest to analysts are described, and all data and program files needed to evaluate these alternative cases are identified. The basic reports generated by the model are presented in Appendix A to this document. Appendix B contains the required formats for all data files accessed by or created within the system. Appendix C is an installation manual containing instructions for reloading and executing a copy of OCSM stored on tape.

23014 **(PB—83-144857) Report to the Fort Belknap Community Council on the work undertaken during the summer, 1979.** Wehrenberg, J.P.; Ballard, J.H.; Pfouts, R.P. (Fort Belknap Community Council, Harlem, MT (USA)). 1979. 75p. NTIS, PC A04/MF A01.

Results are presented of a gravity survey undertaken to determine the potential for oil and gas extraction on the Fort Belknap Indian Reservation. Two hundred forty-eight gravity measurements were taken and at least one major anomaly was found. Analysis of available surface and subsurface information suggests that there is a limited potential for oil but a somewhat better potential for the development of gas. Commercial development of coal is not likely, but there is at least one small coalfield that may be exploited for local use. Bentonite presents the best option for commercial development.

23015 **Useful technique to study particle invasion in porous media by backscattered electron imaging.** Kandarpa, V.; Sparrow, J.T. (Vetter Res Inc). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* 1-7(1981). (CONF-811023—).

The flow mechanism of aqueous fluids containing particles is important for an understanding of the invasion and impairment of petroleum and geothermal formations by particulate matter. This paper describes a relatively new technique that is successfully being used in flow studies of particle suspensions through Berea sandstone cores. The technique is based upon backscattered electron imaging

in the scanning electron microscope. The method was utilized to determine the distribution and depth of penetration of particles in cores. Other related applications of the technique to determine precipitations in cores due to incompatible mixing of waters are also briefly mentioned. 15 refs.

0203 Drilling And Production

REFER ALSO TO CITATION(S) 24497

23016 **(DOE/BETC/RI—83/3) In-situ combustion project at Bartlett, Kansas. Final report.** Miller, J.S.; Spence, K.L. (Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center). Apr 1983. 55p. NTIS, PC A04/MF A01. Order Number DE83008488.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

As part of an ongoing research program for enhanced oil recovery, the Bartlesville Energy Technology Center, US Department of Energy, is in the process of developing petroleum-recovery techcniques for shallow, low-productivity, heavy-oil deposits in southeastern Kansas, southwestern Missouri and northeastern Oklahoma. Personnel at BETC designed and conducted an in-situ combustion experiment on the Link Lease in Labette County, near Bartlett, Kansas. The Nelson-McNeil calculation method was used to calculate oil recovery and predict production time for a 1.25 acre inverted five-spot. Two attempts to ignite the formation are described. The well completion methods, hydraulic fracturing, injection of air, workovers, production techniques, and well-monitoring methods of the process are described. Production results are shown for both combustion attempts. The progression of the burn and the final extent of the burn front were evaluated by the following methods: (1) controlled source audio-frequency magnetotelluric technique (CSAMT), (2) thermogravimetric analysis (TGA), (3) burn-front model, (4)geophysical log analysis, and (5) computer model study. 26 figures, 8 tables.

23017 **(DOE/EIA—0185(82)) Costs and indexes for domestic oil- and gas field equipment and production operations, 1982.** Funk, V.T.; Anderson, T.C. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Dec 1982. 146p. NTIS, PC A07/MF A01. Order Number DE83008809.

This report presents the estimated costs and indexes for domestic oil and gas field equipment and production operations for 1982. The sums (aggregates) of the costs for the hypothetical leases by depth, and/or production rate, and area were averaged and indexed to provide a general measure of the increased or decreased costs from year to year for lease equipment and for lease operations. Summary tables are included in the text of the report and detailed tables are included in the Appendixes. Equipping and operating costs for hypothetical oil leases producing by primary means from depths of 2000; 4000; 8000; and 12,000 feet, have been determined for 6 onshore areas of the contiguous United States. Indexes and costs were calculated for the additional equipment needed for waterflood recovery and its operation for depths of 2000; 4000; and 8000 feet in west Texas. Direct operating costs and indexes were also determined for offshore operations operating in 100, 300 and 600 feet of water from 12- and 18-slot platforms. Equipping and operating costs for hypothetical gas leases producing from depths of 2000; 4000; 8000; 12,000; and 16,000 feet, were determined for 6 onshore areas of the contiguous United States. Composite costs and indexes for flow rates of 50; 250; 500; 1000; 5000 and 10,000 thousand cubic feet per day (Mcfd) by depth and area are presented in summary tables. The index for the aggregate cost of gas lease equipment indicates the moderation in equipping cost increases (increases of 9.5 percent in 1981 and only 3.8 percent in 1982) continued into 1982. These increases are lower than the corresponding CPI's. Aggregate operating costs for gas leases rose 16.0 in 1981 and only 6.1 percent in 1982.

23018 **(DOE/EP—0043/1) Naval Petroleum and Oil Shale Reserves. Annual report of operations.** (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Naval Petroleum and Oil Shale Reserves). Oct 1982. 27p. NTIS, PC A03/MF A01. Order Number DE83008125.

The Naval Petroleum and Oil Shale Reserves (NPOSR), created to provide a source of liquid fuels for the armed forces during national emergencies, were established by a series of Executive Orders between 1912 and 1924. Following the 1973 to 1974 Arab Oil Embargo, which demonstrated the Nation's vulnerability to oil supply interruptions, the Congress authorized and directed in 1974 that the Reserves be explored and developed to their full economic and productive potential. In October 1981, the President notified the Congress of his decision to extend production of the Naval Petroleum Reserves to April 6, 1985. That decision became final when the Congress did not exercise its authority to disapprove the action. With regard to the Naval Oil Shale Reserves (NOSRs), a program was initiated in 1977 to examine the resource for development and subsequent production should national defense requirements so dictate.

23019 **(PB—83-148452) Effect of the rate of adsorption at oil-water interface upon the displacement of residual oil.** Slattery, J.C. (Northwestern Univ., Evanston, IL (USA). Dept. of Chemical Engineering). 1982. 57p. NTIS, PC A04/MF A01.

Research was undertaken to determine the rate of adsorption of surfactant at oil-water interfaces by measuring interfacial tension as a function of time. It was found that the popular spinning drop interfacial tensiometer cannot be trusted to measure equilibrium interfacial tensions in the presence of surfactants. A broad class of techniques for measuring the interfacial tension in which the configuration of axisymmetric interfaces is observed cannot be used to follow interfacial tension as a function of time with sufficient accuracy to allow inference of the adsorption rate coefficient. The Wilhelmy Plate with continuous force measurement can be used to study the rate of adsorption of surfactant at liquid-gas interfaces, but not at liquid-liquid interfaces. Capillary waves created by forced oscillations also can be used to study the rate of adsorption of surfactant at liquid-gas interfaces and to measure interfacial dilatational viscosity.

23020 **Method and apparatus for recovering unstable cores.** Barraclough, B.L.; Mcguire, P.L. (to Dept. of Energy). US Patent 4,371,045. 1 Feb 1983. Filed date 1 Apr 1981. vp.

PAT-APPL-249783.

A method and apparatus suitable for stabilizing hydrocarbon cores are given. Such stabilized cores have not previously been obtainable for laboratory study, and such study is believed to be required before the hydrate reserves can become a utilizable resource. The apparatus can be built using commercially available parts and is very simple and safe to operate.

23021 **Downhole steam injector.** Donaldson, A.; Hoke, D.E. (to Dept. of Energy). US Patent 4,366,860. 4 Jan 1983. Filed date 3 Jun 1981. vp.

PAT-APPL-269460.

An improved downhole steam injector has an angled water orifice to swirl the water through the device for improved heat transfer before it is converted to steam. The injector also has a sloped diameter reduction in the steam chamber to throw water that collects along the side of the chamber during slant drilling into the flame for conversion to steam. In addition, the output of the flame chamber is beveled to reduce hot spots and increase efficiency, and the fuel-oxidant inputs are arranged to minimize coking.

23022 **Applied genetic engineering has a place in petroleum production.** Crull, A.W. *Energy (Stamford, Connecticut);* 7: No. 2, 24-25(Mar 1982).

On the very leading edge of high technology for the eighties is the merger of applied genetic engineering and the emerging technologies for enhanced oil recovery. Within a reservoir, gases such as carbon dioxide, hydrogen, or methane can be produced from a

fermentation process that will increase the reservoir pressure and push more oil out. Various polysaccharides or mucopolysaccharides can be produced that will act in situ in lower interfacial tension. It is possible for microbial action to degrade the large molecules of crude oil and lower the viscosity. An internal sulfonation of molecules by bacterial metabolites can occur and result in the formation of in situ surfactants. Oklahoma State is working under a DOE grant to screen anaerobic Clostrida for enhanced oil recovery. Another Oklahoma State contract from DOE includes a microbial study of the biodegradation of compounds used in EOR.

23023 **Phase behaviour of alkylxylenesulphonate/oil/brine systems.** pp 3-10 of Enhanced oil recovery. Paris, France; Editions Technip (1982).

From 2. European symposium on enhanced oil recovery; Paris, France (8 Nov 1982).

Results are presented for a series of linear alkylxylenesulphonate blends with various average equivalent weights and equivalent weight distributions in a stock-tank crude oil/brine system. For such a system a mathematical expression has been derived that quantitatively relates the midpoint salinity and solubilization parameter to the mole fractions of the various surfactant components in the blend. The scope of these relationships with respect to changes in reservoir conditions has been determined independently. The relationships obtained make it possible to calculate blend compositions with close to optimal properties with respect to phase behaviour for a wide range of reservoir characteristics.

23024 **Results of the Bell Creek Unit "A" micellar/polymer pilot.** pp 215-244 of Enhanced oil recovery. Paris, France; Editions Technip (1982).

From 2. European symposium on enhanced oil recovery; Paris, France (8 Nov 1982).

In June 1976, Gary Energy Corporation initiated a U.S. Department of Energy (DOE) cost-shared 40-acre micellar-polymer demonstration project in unit "A" of the Bell Creek Field, Powder River County, Montana. The 40-acre pilot 5-spot was developed in 1977 by infill drilling four injection wells and an observation well adjacent to one of the injectors. The 40-acre pilot pattern is embedded within a 160-acre area containing nine producing wells. An extensive reservoir engineering analysis was conducted prior to process injection. This analysis included detailed examination of data from pressure pulse testing, injection of radioactive tracers, and logs and cores from the five new infill wells. The analysis indicated the presence of a permeability barrier across the southeast quadrant of the 40-acre confined area. The Uniflood (TM) oil-external micellar-polymer process was chosen for application in the pilot. Union Oil Company designed the process specifically for the Bell Creek reservoir rock and fluid system. A caustic preflush slug of 18.0% pore volume (PV) was injected followed by a 3.9% PV micellar slug. A viscosity tapered polymer slug of 100% PV was specified for injection after the micellar slug to provides mobility control. Conventional water injection into the pilot 5-spot was started in October 1977, and continued through January 1979. This pattern waterflood period was necessary to allow time for the completion of the reservoir analysis. Micellar process injection commenced during February 1979, with injection of the preflush. As of March 31, 1982, 77% PV of the polymer slug had been injected.

23025 **Enhanced oil recovery.** Paris, France; Editions Technip (1982). vp. (CONF-821177—).

From 2. European symposium on enhanced oil recovery; Paris, France (8 Nov 1982).

Separate abstracts have been prepared for individual items within the scope of the Energy Data Base.

23026 **DOE, Gary testing tertiary polymer technique.** Goldburg, A.; Stevens, P.D. (Gary Energy Corp., Englewood, CO). *Western Oil Reporter;* **38**: No. 8, 92-100(Aug 1981).

From Society of Petroleum Engineers/DOE Second Joint Symposium on Enhanced Oil Recovery; Tulsa, OK (5 Apr 1981).

A report is given of a pilot demonstration to determine whether micellar-polymer flooding is a technically and economically feasible enhanced recovery technique for use in the Belle Creek field in Powder River County, Montana. The U.S. Department of Energy is sharing the cost of the project. A radioactive tracer survey was conducted during a pattern reorientation waterflood to give information about reservoir continuity and for numerical simulation of the project. Tritium, Co-60 and Co-57 were used as the tracers. The Intercomp Chemical Simulator was used to predict process recovery. A comparison between predicted and observed results is given in figures. Plans for post-project analysis are presented. (JMT)

23027 **Improving the injectability of high salinity brine for disposal or waterfloodings operations.** Raber, A.; Thompson, R.E.; Smith, F.H. (Lawrence Livermore Lab, CA, USA). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* 1-7(1981). (CONF-811023—).

This work involved extensive field tests at three Strategic Petroleum Reserve conducted by Lawrence Livermore National Laboratory to improve the performance of brine injection wells. It was established that granular media filtration, when used with proper chemical pretreatments, provides an effective and economical method for removing particulates from hypersaline brines. This treatment allows for the injection of 200,000 bpd with significantly increased well half-lives of 30 years. 7 refs.

23028 **Analytical and experimental investigations of rock cutting using polycrystalline diamond compact drag cutters.** Swenson, D.V.; Wesenberg, D.L.; Jones, A.K. (Sandia Natl Lab, USA). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* 1-10(1981). (CONF-811023—).

The development of analytical techniques describing rock fracture during drilling would make possible a more rational approach to the design of drills and bits. This paper describes progress toward this goal based on finite element and experimental investigations of the rock cutting process for a single drag bit. The material model used for rock in the analysis includes fracturing due to both tensile and shear stresses. Results capture the essential features of drilling observed in the laboratory and indicate expected differences between unconfined laboratory tests and downhole drilling. 7 refs.

0205 Products And By-products

23029 **(DOE/ER/10645—8) Flexibility and resiliency of process systems.** Morari, M. (Wisconsin Univ., Madison (USA). Dept. of Chemical Engineering). 1983. Contract AC02-80ER10645. 15p. (CONF-8208113—2). NTIS MF A01. Order Number DE83007321.

From International symposium on process systems engineering; Kyoto, Japan (1 Aug 1982).

Microfiche only, copy does not permit paper copy reproduction.

Because chemical plants are never operating at the nominal design conditions or at a steady state it is important to include aspects of flexibility, operability and control into the design procedures. The available techniques for this purpose are reviewed and future research needs are identified. 9 figures.

0206 Health And Safety

REFER ALSO TO CITATION(S) 24445, 24456

0207 Marketing And Economics

REFER ALSO TO CITATION(S) 23001, 23002, 23038, 23042

23030 **(AD-A—121861/9) A study of the total cost of conventional ship propulsion fuel. Final report FY 1980.** (Naval Sea Systems Command, Washington, DC (USA)). Jul 1981. 44p. NTIS, PC A03/MF A01.

This paper presents the total cost of conventional fuel used by U.S. Navy ships along with the data and methodology used to derive this value. The total cost of fuel consists of much more than the purchase price of a barrel of oil. Once purchased, the fuel must

be stored by fuel terminals and then delivered by fleet oilers to ships on station. These fleet oilers require the protection of ocean escorts since they have a limited self protection capability. Due to the fact that the use of conventional fuel will be continued indefinitely into the future, consideration must be given to the replacement of fleet oilers and ocean escorts. All these factors contribute to the total cost of propulsion fuel used by conventionally powered U.S. Navy ships. The cost values and fuel delivery parameters used are based upon FY 80 data and therefore the basic fuel cost value is in FY 80 dollars. In addition to the derivation of a single fuel cost value, sensitivity analyses present the cost impacts due to variation in value of significant input values and/or assumptions.

23031 **(DOE/EI/10565—T1) Oil and natural gas extraction: a game theoretic approach.** (ICF, Inc., Washington, DC (USA)). Sep 1980. Contract AC01-79EI10565. 42p. NTIS, PC A03/MF A01. Order Number DE83008988.

Portions are illegible in microfiche products.

In previous analyses with the Game Theoretic World Oil Model, time varying production capacity constraints for individual pools have been imposed exogenously. In this report, the possibility of endogenous determination of capacity within the model framework is explored. There have been two major steps associated with this task. The first has been the development of the mathematical foundations of optimal capacity expansion in the dynamic game theoretic setting. The results of this effort are presented in the Appendix. The authors have succeeded in deriving results which are of independent theoretical interest, and which furthermore, lead directly to the specification of the algorithmic steps required. The second major effort has been the implementation and testing of the new algorithm. The results here are disappointing. The algorithm appears to operate correctly, producing results which are consistent with the theory. The computational burden is simply too great, however, to allow optimal investment levels to be routinely computed in the model. The underlying source of the difficulty is the extreme sensitivity of the optimal investment calculations.

23032 **(DOE/EIA—0035(82/04)) Monthly energy review.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Apr 1982. 104p. NTIS, PC A06/MF A01. Order Number DE83008014.

Energy production for January 1982 total 5.5 quadrillion Btu, an increase of 0.3% from the January 1981 level. Decreases in production occurred for natural gas and coal. Natural gas production was down 0.8% and coal 3.3%. Petroleum production increased by 1.1%. All other forms of energy production combined were up by 13.0%. Energy consumption in January 1982 totaled 7.2 quadrillion Btu, a 2.5% decrease compared to consumption for January 1981. Increases occurred in the daily consumption rates of natural gas (6.0%), coal (1.6%), and all other forms of energy (12.0%). The average daily rate of petroleum consumption was down 13.1% from the January 1981 level, accounting for the overall decline in energy consumption during this period. Net imports of energy for January 1982 totaled 0.7 quadrillion Btu, 31.1% below the January 1981 level. By energy source, the decreases in net imports were petroleum, 29.7% and other (electricity and coal coke combined), 13.9%. Increases occurred in natural gas, 13.6%, and net exports of coal, 6.0%.

23033 **(DOE/EIA—0109(83/01)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC). Jan 1983. 116p. NTIS, PC A06/MF A01. Order Number DE83008785.

Portions are illegible in microfiche products.

Data on petroleum supplies and disposition in the US for the month of November 1982 are presented. Included are statistics on production, refinery input and output, imports, exports, and stocks of petroleum and petroleum products. A section is included discussing US petroleum developments and consumption during 1982. (DMC)

23034 **(DOE/EIA—0109(83/02)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC). Feb 1983. 116p. NTIS, PC A06/MF A01. Order Number DE83008816.

Portions are illegible in microfiche products.

Data on petroleum supplies and distribution in the US for the month of December 1982 are presented. Included are statistics on production refinery input and output, imports, exports, and stocks of petroleum and petroleum products. A section is included on refinery shutdown during 1982. (DMC)

23035 **(DOE/FE/60138—T2) Future world oil prices: review of current forecasts, identification of price-determining factors, and delineation of a quantitative framework for analysis.** Hirshfeld, D.S.; Frye, K.N.; Bendersky, C.; Coleman, K.J.; Montano, W.B. (Pyros, Inc., Gaithersburg, MD (USA)). 17 Sep 1982. Contract AC01-82FE60138. 142p. NTIS, PC A07/MF A01. Order Number DE83007929.

Portions are illegible in microfiche products.

This study is part of an examination of strategic questions underlying decisions regarding the US' development of new conventional oil and gas reserves and synthetic fuels production. As a baseline, an attempt is made to identify the actual determinants driving foreign oil prices of which production costs are but one element. By examining what foreign suppliers are charging and what latitude they have to change their prices, we should be better able to identify options for dealing with them. Specifically, we need to know what prices OPEC may want to set over time and how low they could allow prices to go without damaging their economies. Also, we need a better understanding of how much domestic oil consumption could be curtailed by substituting gas and a better understanding of the comparative economics of new oil and gas sources. Eventually, we also need a sound basis for strengthening agreements with western hemisphere oil exporters and improving relations with our oil-consuming allies and non-cartel nations in other parts of the world, all in keeping with the President's new program for developing potential economic allies and reducing their dependency on OPEC oil. This report analyzes: (1) Key energy market and non-market forces, including national policies, that will largely determine future world oil prices; (3) recent world oil price forecasts by a number of public-sector and private-sector organizations; and (3) a framework and method of attack, involving energy market equilibrium analysis, for estimating long-term growth rates in world oil prices in relation to alternative energy policies of the oil-consuming and oil-exporting countries. These topics are all facets of the central issue: the prospective interactions between future world oil prices and US energy policies - particularly those policies that can increase long-term domestic energy supplies.

23036 **(PB—83-115220) Mergers in the petroleum industry: report of the Federal Trade Commission.** (Federal Trade Commission, Washington, DC (USA)). Sep 1982. 344p. NTIS, PC A15/MF A01. Order Number DE83901499.

This report was prepared by the Federal Trade Commission in response to a congressional request that the Commission conduct an investigation of mergers and acquisitions in the petroleum industry. The report is based on data obtained from prior FTC investigations and litigations involving the oil industry, Department of Energy data, responses to questionnaires sent out to 21 oil companies, interviews with industry members, published sources of petroleum industry data and statistical studies relating to acquisitions and competitive activities in the oil industry. The study provides a brief overview of the petroleum industry and discusses the numbers and size and the description of the terms of such mergers in each of the last ten years; factors whihc influence such mergers, including the role of oil price decontrol; te impact on competition and on the availability and prices of petroleum products to consumers; the effect of acquisitions in diverting investment captial for the exploration and development of energy sources; the extent of concentration in each major sector of the industry, the impact of such concentration on competition, and the impactof mergers on concentration levels; the transaction costs of such mergers; and the extent of any asserted efficiency justification for such mergers. Three appendices contian an outline specifying the data used in preparing the report, background correspondence and separate statements concerning the report from three Commissioners.

23037 **(PB—83-139519) Marginal energy cost of goods and services. Final report.** Hannon, B.; Blazeck, T. (Illinois Univ., Urbana (USA). Energy Research Group). Nov 1981. 75p. NTIS, PC A04/MF A01.

This report describes a method of input-output (I-0) energy modeling to measure the flow of energy into and out of an industry. A set of energy intensities based on marginal input coefficients (ratios of changes in inputs to the associated changes in output) is developed. The resulting marginal energy intensities represent the total, direct and indirect, energy required per unit change in output. Marginal coefficients are derived by using I-0 tables for the years 1963, 1967, and 1972. The data includes energy sectors of coal, crude petroleum and natural gas, refined petroleum, electricity, and gas utilities. This data base is used to calculate the marginal energy intensities between 1967 and 1972. The report reviews the formulation of average energy intensities; establishes the theoretical foundation for marginal energy intensities and calculates the intensities. Problems encountered and techniques used in their formulation are described. Findings, conclusions, and recommendations for further work are discussed. Reviewer comments are included in the report.

0208 Waste Management

REFER ALSO TO CITATION(S) 22943, 22949

23038 **(TVA/OP/EDT—83/3) Reclamation of transformer oils containing PCBs by the Sunohio PCBX Process. Final report.** Chen, K. (Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology). Dec 1982. 119p. NTIS, PC A06/MF A01. Order Number DE83901683.

This report documents the findings associated with the reclamation of mineral oils containing PCBs by the Sunohio PCBX process, a chemical destruction process for Polychlorinated biphenyls (PCBs). Thirty thousand two hundred and ninety (30,290) gallons of transformer oils were processed. The untreated oils contained PCB concentrations ranging from 51 to 1100 ppM and had a great variety of dielectric properties. the treatment was carried out from the oils in storage tanks and in the de-energized transformers. The PCB-decontaminated oil quality was evaluated to determine its suitability for potential reuse. Thirteen (13) ASTM standard tests and three special acceptance tests were made on the oil samples to determine physical, chemical, and electrical properties of the treated oil. Three special tests performed include a power-factor valued oxidation test, a sludge-free life test, and a paper aging test. Test results indicate that most of the treated oil qualities were satisfactory in physical and chemical properties; however, some of the treated oil qualities were not acceptable in electrical properties in comparison with ASTM and TVA criteria. Two of the decontaminated oil samples were further filtered, degassed, and tested in the laboratory. The further treated oil quality was very comparable to the ASTM recommended criteria for new oil. The TVA test results indicate that the PCBX process effectively removed PCBs to a concentration of 2 ppM or less; however, improvement of the oil quality from the untreated to the treated state was not statistically significant. The liquid waste, because of its high pH, is hazardous under the corrosivity test established by EPA. The ambient air quality was monitored during the time of treatment and found not to be hazardous to public health. The total cost associated with this treatment was determined and the unit cost per gallon of oil treated was established. 18 figures, 14 tables.

0209 Environmental Aspects

REFER ALSO TO CITATION(S) 22959, 23038, 24291

23039 **(DOE/OR/04940—3) Oil persistence in tundra and its impact on the below-ground ecosystem. Final report.** Linkins, A.E.; Atlas, R.M.; Everett, K.R. (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Biology; Louisville Univ., KY (USA). Dept. of Biology; Ohio State Univ., Columbus (USA)). 1981. Contract AS05-76OR04940. 65p. NTIS, PC A04/MF A01. Order Number DE83008992.

Portions are illegible in microfiche products.

Prudhoe Bay crude oil was applied as a 20 $1/m^2$ surface spray on Eriophorium vaginatum tussock tundra at Eagle Summit, Ak, in August 1979. Oil caused a significant reduction in mycorrhizal root numbers and root respiration rates in Betula nana, but not E. vaginatum root tips which had grown through the 5 to 15 cm deep oil contaminated soil. Significant changes did occur in leaf scenescent patterns of B. nana and the tillering index of E. vaginatum. Soil cellulase and phosphatase enzyme activities both declined in the oiled soil horizons but were unaffected in horizons immediately below visibly contaminated organic matter.

23040 **(FWS/OBS—83/03) Proceedings of a workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of Outer Continental Shelf development.** Keller, C.E.; Adams, J.K. (eds.). (Fish and Wildlife Service, Slidell, LA (USA). National Coastal Ecosystems Team). Feb 1983. 47p. (CONF-8204118—Summ.). Fish and Wildlife Service, Washington, DC. Order Number DE83901664.

From Workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of outer continental shelf development; Long Beach, MS, USA (6 Apr 1982).

The purpose of the workshop was to assemble scientists knowledgeable about cetaceans, sea turtles, and the Gulf of Mexico to discuss the potential impacts of offshore oil and gas development on these animals and make recommendations for future research. The workshop began with brief presentations about the environment of the Gulf of Mexico and the cetaceans and sea turtles found there, and a review of petroleum effects on these animals. The following points were then discussed: (1) ways in which cetaceans and sea turtles have been or could be affected, either directly or indirectly by activities and events associated with offshore oil and gas development were identified; (2) the types and specificity of data needed to predict, detect, and mitigate possible adverse effects were identified; (3) the advantages and disadvatages of various methods that might be used to obtain needed data were discussed; and (4) specific research and monitoring programs that would be required to obtain needed data, including the necessary expertise, level of effort, equipment, and facilities were identified.

23041 **(PB—83-147371) Persistance of Metula oil in the Strait of Magellan six and one-half years after the incident. Final report.** Gundlach, E.R.; Domeracki, D.D.; Thebeau, L.C. (Research Planning Inst., Inc., Columbia, SC (USA)). May 1980. 35p. NTIS, PC A03/MF A01.

This study, undertaken from 18 to 21 February 1981, is based on the resurvey of stations analyzed during August 1975 and February and August 1976 (14, 15). These stations were previously found to contain moderate to heavy concentrations of METULA oil and were considered representative of that shoreline segment. Comparisons to the data derived during 1975/76 are based on repeat topographic profiling at three sites. The physical characteristics (primarily color and consistency) of the remaining oil were noted, and the relationship between substrate (oiled or previously oiled) and resident biological community was given special attention.

0210 Legislation And Regulation

23042 **(DOE/IG—103) Allegations of improper supplier practices affecting gasoline lines at independent stations.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 20 Feb 1980. 22p. TIC. Order Number DE83006125.

Report to the Secretary, Deputy Secretary.

Inspector General investigation failed to verify complaints that gasoline suppliers coerced their independent dealers into limiting their business operations during the petroleum-allocation program implementaton. Recommendations were made for: wider dissemination to gasoline stations of the availability of the dealer-complaint mechanism, including the ERA hotline; identification and further training of investigative personnel in DOE policy and responsibility in such cases: (In particular, what constitutes a violation). A final recommendation dealt with procedural review office guidelines to determine their adequacy an appendix is included indicating agency compliance with recommendations. (PSB)

23043 **(DOE/IG—119) Alleged improprieties concerning the settlement of overcharge violations against the Tauber Oil Company.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 25 Jun 1980. 42p. TIC. Order Number DE83006317.

Report to the Secretary, Deputy Secretary.

This is a report of an investigation into alleged improprieties concerning the successive reductions in overcharge violations computed against-Tauber Oil Company (Tauber) in Houston, Texas by the section of the Department of Energy's (DOE) Economic Regulatory Administration (ERA) that was formerly known as the Federal Energy Administration (FEA). These overcharges involved sales of the following types of products: motor gasoline No. 2, No. 5, No. 6 (1 percent) and No. 6 (3 percent) fuel oil, and benzene, toluene, xylene, and kerosene. Investigation found nothing indicating any illegal or improper conduct by any FEA employee or other person relating to the settlement of this case, which was highly complex, both with regard to applicable law and the facts. (PSB)

0230 Properties

REFER ALSO TO CITATION(S) 23084, 24047, 24072

23044 **(AD-A—121476/6) Frictional characteristics and heat transfer of antimisting fuels in tubes. Final report Aug 80-Sep 81.** Wat, J.; Sarohia, V. (Jet Propulsion Lab., Pasadena, CA (USA)). Aug 1982. 70p. NTIS, PC A04/MF A01.

Experiments have been performed to determine the skin friction and heat transfer behavior of antimisting kerosene (AMK) in pipe flows. The additive used in the AMK was FM-9 developed by Imperial Chemical Industries. AMK has been developed as an aviation safety fuel to reduce post-crash fires. The principle aim of the present investigation was to determine the modification in flow and heat transfer behavior caused by the presence of the antimisting polymer additive in jet fuel. The present study indicates that the AMK skin friction versus Reynolds number, or Nusselt number versus Reynolds number behavior, can be divided into three regions: (1) Newtonian laminar region, (2) shear-thickening transition region, and (3) drag-reducing turbulent region. At low flow rates, AMK has Newtonian behavior, i.e., constant viscosity. At a certain critical wallshear rate which depends on the fuel temperature and additive concentration, shear thickening occurs and causes a large increase in skin friction and heat transfer rates. In the third region, the skin friction and heat transfer rates drop rapidly and fall below the predicted Newtonian flow skin friction and heat transfer values; e.g., for 0.3 percent FM-9 AMK at a temperature of 20 C, 22,000 and 10,000. Beyond these points, there is a reduction in skin friction and heat transfer rates.

0240 Storage

23045 **(BMFT-FB-T—80-123) Geological and geotechnical studies for the construction of pilot caverns in rock for the storage of crude oil, hydrocarbon products and LPG.** Hentschel, J.; Kuehn, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 62p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750368.

Portions are illegible in microfiche products.

For the first time geological and geotechnical studies to explore sites for the underground storage of liquid hydrocarbons in rock caverns are being carried out in the Federal Republic of Germany. Suggestions as well as experience gained during the construction and operation of such caverns in foreign countries could be used. Up to now there are no pre-conditions for an extended underground storage in the western, south-western and southern part of the Federal Republic of Germany in order to enable a well-balanced regional distribution of supplies to be stored. In Baden-Wuerttemberg graphite formations are being investigated by geological-petrographic mapping, seismic, core drilling, several bore hole measurements, strength tests in situ and by means of core samples in laboratories. It could be established that it is possible not only geologically and hydrologically but also with regard to the rock mechanic and the infrastructure to build rock caverns for storage purposes at different sites. Comparable studies can also be carried out in Bavaria, Rhineland-Palatinate, Hesse and North Rhine Westphalia and have chances to be successful. It is intended to provide a pilot cavern.

0250 Combustion

REFER ALSO TO CITATION(S) 22997

23046 **(AD-A—120671/3) Antimisting kerosene atomization and flammability. Interim report.** Fleeter, R.; Petersen, R.A.; Toaz, R.D.; Jakub, A.; Sarohia, V. (Jet Propulsion Lab., Pasadena, CA (USA)). Jul 1982. 183p. NTIS, PC A09/MF A01.

Experimental results are presented exploring various parameters found to affect the flammability of antimisting kerosene (Jet A + polymer additive). Digital image processing has been integrated into a new technique for measurement of fuel spray characteristics. This technique has been developed to avoid many of the error sources inherent to other spray assessment techniques and has applied to the study of engine fuel nozzle atomization performance with Jet A and antimisting fuel. Aircraft accident fuel spill and ingition dynamics have been modeled in a steady state simulator allowing flammability to be measured as a function of airspeed, fuel flow rate, fuel jet Reynolds number and polymer concentration. The digital imaging technique has been employed to measure spray characteristics in this simulation and these results have been related to flammability test results. Scaling relationships have been investigated through correlation of experimental results with characteristic dimensions spanning more than two orders of magnitude.

23047 **(AD-A—121011/1) Shoreside boiler demonstration of fuel-water emulsions. Final report Mar 80-Aug 82.** Cass, R.W.; Pakula, T.J.; Vollemans, P.J. (Seaworthy Engine Systems, Inc., Essex, CT (USA)). Aug 1982. 243p. NTIS, PC A11/MF A01.

Efficiency and emission (particulate and N0x) measurements were performed on a U.S. Coast Guard shoreside boiler. The purpose of the program was to assess any benefits and/or penalties associated with firing a water-in-oil emulsion. The project included installation of instrumentation required for efficiency measurements, identification and installation of a suitable low energy emulsifier and metallographic analysis of tube samples to determine corrosion and erosion due to firing an emulsified fuel for a heating season. Closely controlled tests were performed over the operating load range on the cleaned and tuned boiler firing both neat (straight) oil and emulsified oil. These tests were repeated after firing each of the respective oils for one normal heating season. The results showed the biggest gains in efficiency from boiler cleaning and tuning. There were no significant differences in efficiency when firing neat and emulsified oil. The boiler was slightly cleaner after firing emulsified fuel for the heating season. The particulate emissions were less for emulsified oil firing and excess air could be trimmed closer to stoichiometric.

03 NATURAL GAS

0301 Reserves

REFER ALSO TO CITATION(S) 23052, 23072

23048 **(DOE/EIA—0167(81)) Gas supplies of interstate natural gas pipeline companies, 1981.** Arnold, J. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Dec 1982. 113p. NTIS, PC A06/MF A01. Order Number DE83008813.

Portions are illegible in microfiche products.

This publication provides information on the total reserves, production, and deliverability capabilities of 92 interstate pipeline companies. The purpose of this publication is to provide information on interstate pipeline companies' supply of natural gas during calendar year 1981. The gas supplies of interstate pipeline companies consist of the certificated, dedicated, recoverable, salable natural gas available from domestic in-the-ground reserves; gas pur-

chased under contracts with other interstate pipeline companies; domestically produced coal gas, liquid natural gas (LNG) and synthetic natural gas (SNG); and, imported natural gas and LNG. The domestic in-the-ground reserves consist of company-owned reserves including natural gas in underground storage, reserves dedicated to or warranted under contracts with independent producers, and supplemental or short-term supplies purchased from independent producers and intrastate pipeline companies. Total dedicated domestic gas reserves, owned or controlled by interstate pipeline companies, increased in 1981 by 1.2 trillion cubic feet (Tcf), or 1.2 percent, from 97.1 Tcf at the beginning of the year to 98.3 Tcf at the end of the year. A five-year tabulation shows that domestic interstate gas reserves at the end of 1981 are very close to the reserves reported at the beginning of 1977. Total gas purchased and produced from the dedicated domestic gas reserves in 1981 was 12.0 Tcf, up 3.0 percent from the 11.6 Tcf reported in each of the two preceding years. The 1981 ratio of total domestic reserves to production was 8.2, slightly smaller than the 8.4 ratios reported for 1979 and 1980. The gross change in domestic reserves is calculated at 13.2 Tcf for 1981. This quantity is defined as the difference between year-end 1980 and year-end 1981 reserves, plus 1981 production.

0302 Geology And Exploration

REFER ALSO TO CITATION(S) 23013, 23072, 24498

23049 **(BMFT-FB-T—79-89) Three-dimensional migration of travel time maps.** Lehmann, H.J.; Kluge, D. (Bundesminisierium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 134p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750328.

Portions are illegible in microfiche products.

The system of 3D-Migration programs was fully developed on June, 30th, 1978, after different test computations had proven the possibility of reaching the aims. The transformation of reflection time maps (which are one result of seismic prospecting) into depth maps of certain geological layers was carried out successfully. The method applied is the so-called 'ray-tracing' method, the step by step continuation of the seismic ray paths from the position of measurement (earth's surface) to the position of the reflecting point at the geological interface of question. The actual position of the geological layer for locating wells for oil and gas prospects is resulting.

23050 **(DOE/BC/10498—5) Sonic and electrical properties of partially saturated tight-gas sands. Final report.** Nur, A. (Stanford Univ., CA (USA). Dept. of Geophysics). Mar 1983. Contract AS19-81BC10498. 60p. NTIS, PC A04/MF A01. Order Number DE83009472.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This study was aimed at relating the seismic and the electrical properties of tight-gas rocks to their pore-space geometry, permeability, and level of water saturation. Here we report results of a laboratory experimental study of wave propagation in Cotton Valley and Spirit River Sandstones as a function of partial water saturation (SW) and wave frequency. We find that wave velocities and the velocity ratio are sensitive to the presence of gas. Furthermore, wave attenuation is sensitive to the amount of gas in the pore space. Ultrasonic measurements in tight-gas sands tend to yield higher velocity values, due to the inability of the pore fluid pressure to homogenize during the passage of waves. Laboratory measurements were made also of the complex electrical response of selected tight rocks, and compared with normal permeability Berea Sandstone. The results show that the dielectric property of tight-gas sands is very sensitive to partial water saturation, and may give not only insight into the nature of the pore space, but also provide a practical measure of S/sub w/ in situ. 35 figures, 2 tables.

23051 **(DOE/ET/10136—T1) Eastern Gas Shales Project (EGSP) data files: a final report. Open-file report 81-598.** Dyman, T.S. (Geological Survey, Reston, VA (USA)). 1981. Contract AI01-76ET10136. 57p. NTIS, PC A04/MF A01. Order Number DE83008924.

Portions are illegible in microfiche products.

The United States Geological Survey and Petroleum Information Corporation (PI) of Denver have created two large computerized files of data for the Eastern Gas Shales Project (EGSP) as part of a large responsibility to the Department of Energy (DOE), Morgantown Energy Technology Center (METC), in Morgantown, West Virginia. Computer-compatible well, outdrop, and sample data from EGSP contractors are being stored on digital tape and delivered to METC for subsequent data-base management. This report has been written to: (1) discuss data-file background and development, (2) address specific problems and solutions for future project use, and (3) present a general summary of well- and sample-data file content by state, county, well, contractor, and subject coverage. When looking at the EGSP data-gathering task in retrospect, modifications to project management would have made the data-gathering process more successful. Many problems resulted from having contractors perform their own data encoding. Some EGSP contractors had little knowledge of computer- and data-encoding techniques, and they often delegated encoding responsibilities to subordinates who were not properly informed about procedures. The overall lack of uniformity in analytical procedures and methods resulted in an apparent over-abundance of card classes. Nearly 40% of the available card classes were never used, and about 30% of those used contain fewer than 100 data records. The most serious problem encountered during data-file development has been the long delay in arranging for an efficient retrieval and mapping system. Sample-and well-data file management are now coordinated through METC, and Petroleum Information Corporation maintains an effective in-house data management system for data retrieval and analysis. The present system would have been very useful to retrieve data for contractor needs two years earlier, even though the files were incomplete.

23052 **(DOE/MC/08216—1257) Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales.** Kucuk, F.; Alam, J.; Streib, D.L. (Science Applications, Inc., Morgantown, WV (USA)). 5 Oct 1978. Contract AM21-78MC08216. 37p. NTIS, PC A03/MF A01. Order Number DE83009091.

Portions are illegible in microfiche products.

The US Department of Energy's Morgantown Energy Technology Center (METC) and Science Applications, Inc., are cooperating in the characterization of the Eastern Devonian Shale gas resource. This study, focusing on the Lincoln County, WV, area, characterizes the resource and shows that conventional volumetric techniques cannot be used to determine the amount of gas in place. Previous studies, using calculations based on limited offgassing measurements and volumetric information, have indicated that the resource ranges from 500 TCF to 2400 TCF of gas in place. Previous studies, using calculations based on limited offgassing measurements and volumetric information, have indicated that the resource ranges from 500 TCF to 2400 TCF of gas in place. The volumetric method based on fracture porosity data yields low values; offgassing measurements can be used to determine gas in place if sufficient time is allowed for gas to sorb from the shale matrix. Production-pressure decline curves are presented for several wells to show the effect of sorption on cumulative production. A mathematical model for describing the behavior of a dual-porosity gas reservoir is presented. It shows the effect of sorption on the production behavior of the gas reservoir. It is concluded that the early part of production behavior is controlled by free gas in the fractures, while long-time behavior is controlled by sorption-diffusion mechanisms. 16 figures, 5 tables.

23053 **(DOE/MC/08216—T5) Modeling of Devonian shale gas reservoirs. Task 16. Mathematical modeling of shale gas production (2D model). Final report.** (Science Applications, Inc., Morgantown, WV (USA)). 31 Jul 1980. Contract AM21-78MC08216. 117p. NTIS, PC A06/MF A01. Order Number DE83008927.

Portions are illegible in microfiche products.

The Department of Energy (DOE), Morgantown Energy Technology Center (METC) has been supporting the development of flow models for Devonian shale gas reservoirs. The broad objectives of this modeling program are to: (1) develop and validate a mathematical model which describes gas flow through Devonian shales; (2) determine the sensitive parameters that affect deliverability and recovery of gas from Devonian shales; (3) recommend laboratory and field measurements for determination of those param-

eters critical to the productivity and timely recovery of gas from the Devonian shales; (4) analyze pressure and rate transient data from observation and production gas wells to determine reservoir parameters and well performance; and (5) study and determine the overall performance of Devonian shale reservoirs in terms of well stimulation, well spacing, and resource recovery as a function of gross reservoir properties such as anisotropy, porosity and thickness variations, and boundary effects. During the previous annual period, a mathematical model describing gas flow through Devonian shales and the software for a radial one-dimensional numerical model for single well performance were completed and placed into operation. Although the radial flow model is a powerful tool for studying single well behavior, it is inadequate for determining the effects of well spacing, stimulation treatments, and variation in reservoir properties. Hence, it has been necessary to extend the model to two-dimensions, maintaining full capability regarding Klinkerberg effects, desorption, and shale matrix parameters. During the current annual period, the radial flow model has been successfully extended to provide the two-dimensional capability necessary for the attainment of overall program objectives, as described above.

23054 (DOE/MC/08339—1348) Project to test for shale gas in Ohio. Final report. (Donohue, Anstey and Morrill, Boston, MA (USA)). Apr 1981. Contract AC21-79MC08339. 194p. NTIS MF A01. Order Number DE83006907.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted.

The search for viable shale gas is the search for fractures in the shale. One possible method to find deep zones of natural fracture is the measurement of the speed of sound in the shale. This speed is expected to be lowered by the presence of fractures, particularly if the fractures contain gas. The seismic reflection method, which times the echoes from deep rock layers, can be used to measure the speed of sound (the seismic velocity) in the shale. Accordingly the present project was undertaken to make such measurements along a 125-mile line crossing SE Ohio, to search for local lowering of this speed, and to drill and test 1 to 3 shale-gas wells on such local lows. The results of the seismic velocity analysis are summarized. Several velocity lows are apparent, and two of these were proposed for test. A well was drilled on one of these anomalies in Elk Township, Noble County. Gas was obtained from two naturally-fractured zones in the Chagrin shale. The well was stimulated and tested at three separate levels: the Rhinestreet shale, the Huron shale, and the Chagrin. Initial production is of the order of 30 Mcf/d from the Rhinestreet, 35 Mcf/d from the Huron, and 110 Mcf/d from the Chagrin. Economic analyses suggest that the Rhinestreet and Huron are not in themselves commercial; the Chagrin is marginal at a gas price of $2/Mcf but commercially attractive at $5/Mcf. Practical problems remain in the preparation of seismic velocity analyses, and enigmas remain in interpreting the test well. However, velocity analysis seems to have a place among the techniques for locating shale-gas wells.

23055 (DOE/MC/12159—1344) Correlation of surficial geologic anomalies with gas production, Cottageville Field, West Virginia. Hodges, L.T. (GeoEnergy Corp., Las Vegas, NV (USA)). Dec 1979. Contract AP21-79MC12159. 29p. NTIS, PC A03/MF A01. Order Number DE83008965.

Surface geomorphic features such as linear stream segments, linear ridge segments, opposed drainages were mapped, measured, and plotted for the Cottageville and Mount Alto topographic 7.5-minute quadrangles of West Virginia. The above anomalies were then compared for the Cottageville gas field area (production from Devonian shales), and for areas outside the gas field. While differences in orientation and density of these anomalies are present over the quadrangle areas, the differences did not seem to be related to the presence of the gas field. Because this study was limited in scope, further analysis of the surface anomalies could be useful. Use of aerial photos, including multispectral photos, and computer analysis techniques should be emphasized.

23056 (DOE/MC/14060—T1) Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report. Rdissi, A. (Gruy Federal, Inc., Houston, TX (USA)). Sep 1981. Contract AC21-80MC14060. 20p. NTIS, PC A02/MF A01. Order Number DE83009287.

Portions are illegible in microfiche products.

The objective of the Offset Well Testing Program is to determine an adequate well spacing to optimize gas production from the Devonian shales by studying the flow of gas through the natural fractures in the shale matrix as manifested by reservoir characteristics (permeability, porosity, fluid saturation, and orientation and distribution of the intrinsic fracture network). To accomplish this objective, two offset wells were drilled within 150 feet of an existing well: one (well A) in the direction of maximum permeability and the other (well B) in the direction of minimum permeability. The site selected was in Meigs County, Ohio, on a lease owned by Columbia Gas Company. An existing producing well, Columbia Well No. 10056, became the control well. The first hole, Well 10056A, was spudded on January 19, 1981. Directional surveys were taken at regular intervals throughout the drilling operation so that corrective measures could be taken if deviation became significant. Drilling was subsequently continued to a total depth of 3490 ft and was completed on February 11. Well 10056B was spudded on February 14, 1981. Drilling and casing programs were almost identical with those for well 10056A, and the same directional surveys were taken. Gyroscopic surveys of the completed wells were taken, followed by a suite of dry-hole electric logs (gamma ray, density, temperature, induction, and audio). Directional surveys showed that the distance between bottomhole locations of the control well and offset well A was 123 ft; the corresponding distance for offset well B was 119 ft. The angle between the lines joining the control well and the two offset wells is 117°. 7 figures, 1 table.

23057 (DOE/MC/14693—1296-Vol.1) Analysis of the Devonian shales in the Appalachian Basin. (Cliffs Minerals, Inc., Granville, WV (USA)). Sep 1982. Contract AC21-80MC14693. 117p. NTIS, PC A06/MF A01. Order Number DE83003033.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In July of 1980, a contract was submitted to the DOE by The Cleveland-Cliffs Iron Company for a data integration program to accumulate and analyze data that were published by many contractors under the Eastern Gas Shales Project (EGSP). The main objective of the program was to define the natural gas potential of the Devonian Shale in the Appalachian Basin. The basin analysis was implemented to complement the drilling of oriented core wells in the basin and correlate the stratigraphic, lithologic, fractographic, geochemical and stress data to known natural gas production. The result would be an exploration rationale for the Devonian Shales in the Appalachian Basin. The data integration program began in September of 1980, six years after the initial EGSP program began. Discussions with other prime contractors and the Department of Energy's personnel led to a list of deliverable items that are appropriate to project objectives and that would best outline the parameters affecting gas production, including: (1) regional fracture (joint) studies; (2) stress analysis of the basin; (3) physical characterization of the shales; (4) definition of geologic structural features; (5) stratigraphic correlations; and (6) lithologic and geochemical descriptions. A large amount of data related to all these items had been generated by the program before the initiation of this contract, so we set out to compile the information on a single map scale to facilitate data comparisons. The U.S.G.S. began development of a data base map at a scale of 1:1,000,000 and this was chosen as the format to use in this report. 36 figures, 5 tables.

23058 (DOE/MC/14693—1296-Vol.2) Analysis of the Devonian shales in the Appalachian Basin. Volume II. Appendices. (Cliffs Minerals, Inc., Granville, WV (USA)). Sep 1982. Contract AC21-80MC14693. 328p. NTIS, PC A15/MF A01. Order Number DE83003035.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Thirty-three wells were core drilled from 1975 through 1981 for the Eastern Gas Shales Project in the Appalachian Basin. The

following appendices are a compilation by well of all the fracture data, mechanical characterization tests, stratigraphic projections, geologic structural interpretations, and gas production information available through the Unconventional Gas Resources Library at DOE/METC, Morgantown, West Virginia. The well summary charts that are located as the last figure for each well description contain the detailed fracture distributions and mechanical test results for the stratigraphic members cored. The gamme ray log and density log are reproduced on each chart to show the correlation to stratigraphic members of the Devonian Shale sequence. A large quantity of data was collected in the early stages of the program to define the relationship of radioactivity to the individual shale members. The relationship serves as a useful tool in correlating the radioactive organic shales across the entire Appalachian Basin. Temperature and noise logs were included, when they were available, to show zones of gas emanation in the well bore. The mechanical test results columns include pretest fractures in the samples, maximum ultrasonic velocity directions, orientation of cracks from point load tests, weakest tensile strength directions from directional tests, and crack orientations from hydrofracture tests when available. All of this information has also been plotted by stratigraphic member and summarized at the bottom of each column for comparison with the other physical properties of the shales.

23059 **(DOE/NV/10249—T1) Approximation of continuity of lenticular Mesaverde Group sandstone lenses utilizing close-well correlations, Piceance Basin, NW Colorado. SPE 11610.** Peterson, R.E.; Kohout, J.B. (CER Corp., Las Vegas, NV (USA)). 1982. Contract AC08-82NV10249. 22p. NTIS, PC A02/MF A01. Order Number DE83008764.

Portions are illegible in microfiche products.

Mesaverde Group sandstone units in 13 closely-spaced wells in the central and southern Piceance Basin of Colorado were correlated utilizing wireline log response quantitatively and qualitatively. Based on these correlations, the environmental subdivisions of the Mesaverde Group were characterized as follows: (1) paralic (upper mixed-marine) zone, occurring in the uppermost Mesaverde Group, includes thick sandstone units which are interpreted to be regionally continuous, (2) fluvial zone, containing point-bars 20 to 30+ ft thick, is interpreted to be correlatable to a maximum of 6800 ft, and (3) paludal zone has insufficient data to adequately characterize the sand units. However, 63 percent of the units are correlatable across at least 139 ft. An approximation of the dimensional characteristics of Mesaverde sandstone units has potential applications in designing hydraulic fracturing treatments and estimating gas reserves more accurately. 15 figures, 2 tables.

23060 **(SAND—83-0287) Mineralogy and petrology aspects of Mesaverde Formation at Rifle Gap, Colorado, specific to the sedimentology and gas-bearing intervals in the subsurface.** Heinze, D.M. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 39p. NTIS, PC A03/MF A01. Order Number DE83009473.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Rifle Gap, situated on the eastern edge of the Piceance Creek Basin, northwestern Colorado, has been the focus of sedimentological studies in an effort to understand the tight, gas-bearing intervals of the inner-basin subsurface. These Mesaverde Formation sandstone exposures were sampled and anlayzed for mineral content and grain morphology. Varying detrital mineralogy supports a sedimentological model for the area which includes shoreline blanket, paludal, fluvial, and marine zones (from bottom to top). Observable mineralogical determinants for the depositional groups include chert, organic and feldspar content, sorting, and grain size. Statistical methods were successful in distinguishing groups in the data which correspond nicely to the model's environments of deposition. Analcime, feldspar, clay, rock fragments, and organics are significant variables in group separation. Time, stability, rock matrix relationships, and grain morphology are proposed as explanatory elements for correlations of variables. The upper and lower half of the section have distinctly different analcime content. Kaolinite is correlated inversely with analcime suggesting an alteration relationship dependent on alkaline lake waters. All observations, correlations, and interpretations of the Rifle Gap data provide a basis for explaining gas-bearing subsurface deposits in the Department of Energy's Wester Gas Sands project Multi-Well Experiment, 12 miles away.

23061 **(USGS-OFR—80-938) Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan.** Leventhal, J.S. (Geological Survey, Reston, VA (USA)). 1980. Contract AI01-76ET10136. 36p. NTIS, PC A03/MF A01. Order Number DE83009265.

Portions are illegible in microfiche products.

Core samples from Devonian shales from three localities in West Virginia, and one locality each in Illinois, Indiana and Michigan have been analyzed for major, minor, and trace constituents. As observed previously (Leventhal, 1978, 1979b), the organic C and total S show large variations which seem to be the major control on the trace elements of interest (U, V, Mo, Hg, As, Co, Cu, Zn). The samples from the Illinois and Michigan Basins appear to show the same ranges of chemical compositions and geochemical controls as those from the Appalachian Basin. 15 figures, 6 tables.

23062 **(USGS-OFR—81-181) Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980.** Schmoker, J.W. (Geological Survey, Reston, VA (USA)). 1981. Contract AI01-76ET10136. 61p. NTIS, PC A04/MF A01. Order Number DE83009061.

The organic-matter content of the Devonian shale of the Appalachian basin is an important characteristic for assessing the natural-gas resources of this shale, and patterns of organic-matter distribution convey information on sedimentary processes and depositional environments. In most of the western part of the Appalachian basin, the organic-matter content of the Devonian shale can be estimated from formation-density wire-line logs (density-log method) and from gamma-ray wire-line logs (gamma-ray method) by evaluation of equations which are presented in this report. The distribution of organic matter in the organic-matter-rich facies of the Devonian shale is characterized in the western part of the Appalachian basin by use of data derived from density logs. The thickness of organic-matter-rich facies ranges from less than 300 ft. (91 m) in east-central Kentucky to 1000 ft (305 m) along the Kentucky-West Virginia border. The average organic-matter content of the organic-matter-rich facies increases from 5% by volume in the central part of the Appalachian basin to 16% in east-central Kentucky. The histogram of organic-matter-content values within the organic-matter-rich facies is closely approximated by the exponential curve y = 1.1e/sup -0.288x/ in New York, Pennsylvania, and West Virginia, but in Ohio, Kentucky, and Virginia, the histogram shifts towards hhgher values of organic-matter content and is not well represented by an exponential function. The net thickness of the blanket of organic matter contained in the organic-matter-rich facies ranges from about 20 to 80 ft (6.1 to 24.4 m) within the mapped area, and local depositional maxima are centered in Martin County, Kentucky, eastern Pike County, Ohio, and northern Ashland County, Ohio. 24 figures.

0303 Drilling, Production, And Processing

REFER ALSO TO CITATION(S) 23017, 23020, 23052, 23053, 23055, 23056

0306 Marketing And Economics

REFER ALSO TO CITATION(S) 23002, 23031, 23032, 23037, 23048

23063 **(DOE/EIA—0342(82)) Gas deliverability and flow capacity of surveillance gas fields in Texas.** Rahman, H.; Hicks, J.N. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Oct 1982. 40p. NTIS, PC A03/MF A01. Order Number DE83008791.

Portions are illegible in microfiche products.

This report presents the findings of a study that assessed the deliverability and flow capacity of 606 large (surveillance) gas fields in Texas. The study includes all 12 Railroad Commission districts and is an extension of a pilot study of the gas fields in Railroad Commission District 8. Gas production from the 606 surveillance gas fields amounted to 63 percent of the gas well production

and 50 percent of the total gas production from Texas during 1971 to 81. Calculations of the flow capacity of these 606 fields were made with a computer program that used the back-pressure equation and the gas material balance equation with no water influx. The flow capacity was calculated annually from 1982 to 2001. During this period, the number of surveillance fields decreased from 606 to 407 and the flow capacity decreased from 3795 to 746 billion standard cubic feet of gas per year. The calculated flow capacity for 1982 is 21.7 percent more than the actual production during 1981. In 1982, 214 of the 606 surveillance fields deliver gas at maximum rate and by 1993 all of the remaining surveillance fields will be delivering gas at maximum rate. It may be observed from this study that there will be little, if any, reserve flow capacity from the producing surveillance gasfields in Texas after 1989. From this study of surveillance gas fields, it may be concluded that future exploration over the next 20 years (1982 to 2001) must be very successful to offset the declining gas production in Texas.

23064 **(DOE/NBM—3008773) Natural gas revenues of major energy companies, 1977-1981.** Cantor, D.J. (Library of Congress, Washington, DC (USA). Economics Div.). 9 Mar 1983. 11p. NTIS, PC A02/MF A01. Order Number DE83008773.

Portions are illegible in microfiche products.

This report presents an analysis of the levels and trends of natural gas revenues of 26 major US energy companies for the period 1977 through 1981. The companies are those whose corporate financial data are reported to the US Department of Energy, Energy Information Administration for its Financial Reporting System (FRS). The period under review is constrained by the availability of FRS data. Nevertheless, the period extends from the year immediately prior to enactment of the Natural Gas Policy Act of 1978 (NGPA) through most of the period during which NGPA pricing has been in effect, and during the period of sharply rising crude oil prices from 1979 through mid-1981. All of the data discussed herein treat only revenues, production, and reserves for domestic oil and gas operations of the FRS companies. Natural gas is a significant element of the upstream operations of major energy companies, most of which are oil companies. Gas revenues have risen since 1977 and account for 20% of their combined gross revenues from the sale of domestic crude oil and gas. These companies market about 1/2 of the domestic gas produced in the US and control more than 1/2 of the natural gas reserves.

23065 **(DOE/RG/10268—T4) Marginal-cost pricing for gas distribution utilities: further analyses and models.** Guldmann, J.M.; Pollard, W.; Tybout, R.A.; Aki, C.Z.; Lee, K. (National Regulatory Research Inst., Columbus, OH (USA)). Dec 1981. Contract FG01-80RG10268. 290p. NTIS, PC A13/MF A01. Order Number DE83009103.

Portions are illegible in microfiche products.

The effects of gas marginal-cost pricing on the demand for natural gas and on changes in the capital and operating costs of gas distribution utilities are important issues in the Public Utility Regulatory Policies Act of 1978 (see PURPA: Section 306-Gas Utility Rate Design Proposals). However, to base rates on marginal costs, it is first necessary to confidently calculate these marginal costs. It is the purpose of this study to provide data and methods for such cost calculations and for designing rates based on these costs. Several empirical statistical investigations of the structure of various cost categories of gas distribution utilities, at the exclusion of gas supply costs, are first presented. One stream of analyses focuses on distribution plant (investment) costs at the community/local level, using data gathered from six different distribution utilities. A new specification for the cost model is used, significantly improving the regression fits obtained in previous research. All the results confirm the joint character of gas distribution plant costs and provide ready means to estimate the corresponding marginal costs for the different sectoral markets at the community/local level. The other stream of analyses, in contract, provides cost models based on data characterizing the whole utility, and gathered from 119 US gas distribution companies. Computerized and simplified approaches to the calculation of gas marginal costs and to the formulation of marginal cost pricing policies are then developed, with, as a major emphasis, the calculation of gas supply marginal costs, accounting for usual pipeline rate schedules that involve demand charges and take-or-pay clauses in addition to commodity charges.

0307 Waste Management

23066 **(DOE/EIA—0130(83/01)) Natural gas monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Jan 1983. 187p. NTIS, PC A09/MF A01. Order Number DE83008803.

This report presents current data on the consumption, disposition, production, prices, storage, import and export of natural gas in the United States. Also included are operating and financial data for major interstate natural gas pipeline companies plus data on fillings, ceiling prices, and transportation under the Natural Gas Policy Act of 1978. A feature article, entitled Main Line Natural Gas Sales to Industrial Users, 1981, is included. Highlights of this month's publication are: Marketed production of natural gas during 1982 continued its downward trend compared to 1981, with November production of 1511 Bcf compared to 1583 Bcf for November 1981; total natural gas consumption also declined when compared to 1981; as of November 1982, working gas in underground storage was running ahead of a similar period in 1981 by 109 Bcf (3.4 percent); the average wellhead price of natural gas continued to rise in 1982; and applications for determination of maximum lawful prices under the Natural Gas Policy Act (NGPA) showed a decrease from October to November, principally for Section 103 classification wells (new onshore production wells).

0308 Environmental Effects

REFER ALSO TO CITATION(S) 22959, 24290, 24842

23067 **(UCRL—52000-83-1, pp 1-12) Predicting hazards from large spills of liquefied gases.** Jan 1983. NTIS, PC A03/MF A01. Order Number DE83009213.

Portions are illegible in microfiche products.

In Energy and technology review.

A number of predictive models for forecasting hazards resulting from LNG spills are evaluated using the results of an extensive series of field experiments on the behavior of large volumes when spilled under a variety of conditions. The tests verified our hypothesis that a large cloud behaves quite differently from a small one. Clouds enriched by heavier hydrocarbons resulting from differential boiloff may be more easily detonated. RPT explosions may play an important role in determining the outcome of a spill. Our analysis of the vapor burn tests is still in its early stages; the first and flame velocities we observed were larger than those reported in small-scale experiments, but establishing scale-related effects will require further examination of the data. Comparisons of model calculations with the data from our cloud-dispersion tests are encouraging. The sophisticated three-dimensional FEM3 model successfully accounted for cloud bifurcation and terrain effects and gave reasonably accurate values for measured downwind LFL. The simpler cross-wind-averaged SLAB model also gave reasonable LFL values, though because of inherent limitations it could not reproduce the bifurcation or terrain effects. Our comparisons also revealed serious deficiencies in Gaussian models. These models, such as the Germeles-Drake model, should not be considered conservative under all atmospheric conditions and should be abandoned. Our results confirmed that 40-m^3 LNG experiments mark a threshold for observing large-cloud effects. Models that can reproduce the 40-m^3 results should be used next to predict the behavior of larger spills. Dispersion, vapor-burn, and RPT experiments conducted in LNG spills of 100 to 200 m^3 would provide a fair test.

23068 **(UCRL—53383) SLAB: a time-dependent computer model for the dispersion of heavy gases released in the atmosphere.** Morgan, D.L. Jr.; Morris, L.K.; Ermak, D.L. (Lawrence Livermore National Lab., CA (USA)). 20 Jan 1983. Contract W-7405-ENG-48. 17p. NTIS, PC A02/MF A01. Order Number DE83008724.

The SLAB model describes the dispersion and gravity flow of a heavy gas released into the atmosphere at ground level, using a crosswind-averaged form of the conservation equations of mass, momentum, species, and energy. The model is time-dependent and one-dimensional in that the equations depend on only one spatial dimension, downwind distance. On the other hand, the model is

quasi-three-dimensional since it contains equations to determine the crosswind dimensions of the dispersing cloud. Specific submodels are included to describe wind speed as a function of height, air entrainment into the cloud as the result of turbulent mixing, and heat and momentum flow between the cloud and the ground beneath it and the air surrounding it. The SLAB computer code determines the properties of the dispersing heavy-gas cloud by employing the method of lines to numerically integrate the partial differential equations that comprise the model.

23069 **(UCRL—88780) Large-scale hazardous gas release experiments.** Koopman, R.P.; Goldwire, H.C. Jr.; McRae, T.G. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 10p. (CONF-830321—1). NTIS, PC A02/MF A01. Order Number DE83008406.

From JANNAF safety and environmental protection meeting; Livermore, CA, USA (8 Mar 1983).

Portions are illegible in microfiche products.

Lawrence Livermore National Laboratory (LLNL) is conducting safety research under the sponsorship of the US Department of Energy (DOE), the US Air Force, the US Coast Guard, and the Gas Research Institute (GRI), to determine the possible consequence of accidental releases of liquefied natural gas (LNG), nitrogen tetroxide (N_2O_4), and ammonia (NH_3). The LLNL program includes both the collection of data from various size experiments and development of computer models to make predictions for conditions under which tests cannot be performed. Recent large-scale dense gas disperson, combustion, and rapid-phase-transition (RPT) experiments conducted at Maplin Sands and Thorney Island, England, and China Lake, California are described. Analysis of the data from the 40-m^3 LNG spills at China Lake is presented. Upcoming tests involving large releases of N_2O_4 and NH_3 are described.

23070 **(UCRL—88781) BAGI: a technique for the detection and tracking of large gas clouds.** McRae, T.G. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 8p. (CONF-830321—2). NTIS, PC A02/MF A01. Order Number DE83008405.

From JANNAF safety and environmental protection meeting; Livermore, CA, USA (8 Mar 1983).

For the past six years the Liquefied Gaseous Fuels (LGF) Spill Effects Program at the Lawrence Livermore National Laboratory (LLNL) has been studying the possible hazards associated with large-scale spills of hazardous materials. This effort has focused primarily on modeling and measurement of the dispersion of large, heavier-than-air gas clouds. A need was discovered for the development of a system which would allow the remote detection and tracking of these large hazardous gas clouds. A passive infrared (IR) imaging system for use in monitoring liquefied natural gas (LNG) vapor cloud dispersion and vapor cloud combustion dynamics is being developed. The heart of the imaging system is the Inframetrics, Inc., Model 210 Fast Scan IR Thermal Imager. This is a two-wavelength, broadband system which when mounted in a helicopter, and with appropriate choice of interference filters, provides images of the dispersing gas cloud. These images were used to augment the LFG Program's surface gas measurement data taken during the Burro Series tests at the Naval Weapons Center (NWC), China Lake, CA. This system relies on the thermal radiation from the ground to produce a background image and the absorption bands of methane, ethane, and propane to attenuate this background image when the vapor is present. The system demonstrated the ability to image the LNG vapor cloud from an altitude of 1 km for gas concentrations down to about 1%. The BAGI technique is based on the radiation augmentation of the field of view of an imaging device by laser radiation corresponding to an absorption line of the gas species to be detected. Schematic representation of several BAGI systems as proposed both for leak detection and the tracking of a hazardous gas cloud are shown.

23071 **(UCRL—88782) Denser-than-air dispersion modeling in the atmosphere.** Ermak, D.L. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 17p. (CONF-830321—3). NTIS, PC A02/MF A01. Order Number DE83008407.

From JANNAF safety and environmental protection meeting; Livermore, CA, USA (8 Mar 1983).

Portions are illegible in microfiche products.

A brief description is given of the representative types of models that have been developed to simulate the atmospheric transport of a heavy gas release. Emphasis is placed on describing the major differences between the various types of models and on the description of the Lawrence Livermore National Laboratory (LLNL) FEM3 model. FEM3 is a three-dimension, time-dependent model which predicts the dispersion of a heavy gas release over complex terrain by numerically solving the conservation equations of mass, momentum, energy and species. Recent comparisons of FEM3 predictions with the results from large-scale liquefied natural gas (LNG) vapor dispersion experiments and applications of FEM3 to the dispersion of ammonia aerosols are presented. The model predictions compare very well with the LNG experimental results and the effects of terrain on the dispersing natural gas (NG) vapor cloud is clearly demonstrated. As the wind speed is lowered and the atmosphere becomes more stable, gravity spreading is shown to be the dominant phenomena affecting the dispersion of the heavy gas cloud.

0309 Artificial Stimulation

REFER ALSO TO CITATION(S) 23054, 24497

23072 **(DOE/MC/08216—T3) Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales.** (Science Applications, Inc., Morgantown, WV (USA)). Jan 1980. Contract AM21-78MC08216. 20p. NTIS, PC A02/MF A01. Order Number DE83008774.

The eastern gas-bearing shales underlie an area of approximately 200,000 square miles in the Appalachian, Michigan, and Illinois basins. Up to 900 trillion cubic feet (tcf) of natural gas are estimated to be contained in the fractures and matrix of these rocks, but only a small percentage is being recovered. The Eastern Gas Shales Project (EGSP) is a comprehensive, multidisciplinary project using existing technical expertise from government agencies, state geological surveys, universities, research institutes, the US Geological Survey, national labs, and private industry. Its overall goal is to advance technology development and commercial production of natural gas from the Devonian Shale. To determine the composition and characteristics of the Eastern Devonian Shales, geological, geochemical, and physical data are being analyzed. An inventory of the total natural gas resource, determination of the economically recoverable resource, and identification of new exploration techniques for locating gas-filled fractured shale reservoirs are part of this activity. Some wells in the Devonian Shales produce naturally at economic rates, but most have to be stimulated to increase the flow rate for commercial production. The flow of gas from the shale matrix to the wellbore through the fractures is slow because of the very low permeability of shale rock. Stimulation techniques are directed at increasing the number of fractures in the shale connected to a wellbore. Conventional and new stimulation techniques are being tested and evaluated by EGSP contractors. Sites are selected, drilling and stimulation are monitored and performance is evaluated. A critical phase of the EGSP is to see that feasible ideas and information are disseminated and usable techniques and devices are implemented. The EGSP attempts to accelerate the usual process and to encourage the private sector to develop the unconventional natural gas from Devonian Shale.

23073 **(DOE/MC/08216—T4) Evaluation of stimulation technologies in the Eastern Gas Shales Project.** Young, C. (Science Applications, Inc., Fort Collins, CO (USA)). 1983. Contract AM21-78MC08216. 8p. NTIS, PC A02/MF A01. Order Number DE83009090.

Portions are illegible in microfiche products.

A technical review has been completed of the stimulation technologies being applied to or considered for the Eastern Gas Shales. This review included a consideration of the production characteristics of the shales amenable to stimulation as well as consideration of the physical processes associated with each stimulation method. The review efforts culminated in a workshop held in Morgantown on May 18th and 19th, 1978. In this workshop, specific consideration was given to the known production characteristics of Devonian Shales, the geologic and tectonic control of Devonian

shale gas production, reservoir and production simulation methods applicable to the Devonian shale, the modeling and analysis of the various stimulation methods being considered and, finally, instrumentation needs for the field evaluation of stimulation effects and the consequent changes in production characteristics. This report summarizes the results and primary conclusions of this workshop and the related efforts conducted by Science Applications during the two months preceding the workshop.

23074 **(DOE/NBM—3008921) Bibliography of Upper Devonian-Shale sequence.** Triplett, J.C.; Trumbo, D.B. (Department of Energy, Morgantown, WV (USA). Morgantown Energy Research Center). Dec 1975. 83p. NTIS, PC A05/MF A01. Order Number DE83008921.

A bibliography on the geology, oil and gas potential, and hydraulic fracturing of upper Devonian black shales is presented. (DMC)

23075 **(DOE/NBM—3008922) Unconventional gas resources.** Komar, C.A. (ed.). (Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center). 1980. 36p. NTIS, PC A03/MF A01. Order Number DE83008922.

This document describes the program goals, research activities, and the role of the Federal Government in a strategic plan to reduce the uncertainties surrounding the reserve potential of the unconventional gas resources, namely, the Eastern Gas Shales, the Western Gas Sands, Coalbed Methane, and methane from Geopressured Aquifers. The intent is to provide a concise overview of the program and to identify the technical activities that must be completed in the successful achievement of the objectives.

23076 **(DOE/NBM—3008923) Effectiveness of hydraulic-fracturing treatments in the Devonian Shale.** Yose, A.B. II. (USDOE Morgantown Energy Technology Center, WV). [nd]. 25p. NTIS, PC A02/MF A01. Order Number DE83008923.

Portions are illegible in microfiche products.

For more than 2-1/2 years, the Morgantown Energy Research Center's Eastern Gas Shales Project has actively pursued a program in stimulation technology to advance the state of the art for the Devonian Shale. This paper compares the effectiveness of 46 hydraulic fracturing treatments to conventional borehole shooting, using production history as a basis. The wells are compared on a regional basis to enhance the comparison. Included in the discussion are some of the most recent efforts under the Eastern Gas Shales Project to determine the effectiveness of cryogenic and foam fracturing techniques and the results to date. 7 tables.

23077 **(SAND—83-0083) High-energy gas-fracturing development. Quarterly report, October-December 1982.** Cuderman, J.F. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 54p. NTIS, PC A04/MF A01. Order Number DE83009387.

The purpose of this study is to develop and optimize the High Energy Gas Fracturing (HEGF) technique to produce multiple fractures around a wellbore in order to stimulate natural-gas production in Devonian shale. The HEGF technique uses a wellbore charge of a propellant tailored to produce pressure loading in the borehole that avoids crushing yet produces multiple fractures radiating from the wellbore. The multiple-fracture regime has been characterized and releated to parameters such as borehole size, pressure risetime, and surface-wave velocity. Pressure risetimes and peak pressures, measured for different propellants in boreholes to specify a propellant for a desired peak pressure and pressure risetime. Semiempirical models, using results from previous experiments, successfully relate stress, acceleration, and fracture radii in surrounding rock to peak pressure and pressure risetime. A finite-element model also has been developed which predicts fracture type and direction of fractures as a function of pressure loading, in situ stress, and material properties. A full-scale HEGF system has been developed for application in gas-well-stimulation experiments in Devonian shale. During this quarter, a proof test of the full-scale HEGF was conducted at the Nevada Test Site (NTS). The designed pressure pulse of 0.5 ms risetime was achieved, and the tamp remained in place during the test. The borehole was successfully cleared posttest. Multiple fracturing was verified with a downhole TV camera. The test of the full-scale hardware and its operational capability was successful. As a result, the HEGF system is ready for application in gas-well-stimulation experiments in Devonian shale. Tests were conducted to determine worst-case accident scenarios to establish sensitivity to shock and fire. There appears to be no risk of initiation resulting from shock or breakage of the propellant-canister segments.

0320 Transport, Pipelines, And Handling

REFER ALSO TO CITATION(S) 23430

0330 Properties

REFER ALSO TO CITATION(S) 23057, 24072

0340 Combustion

REFER ALSO TO CITATION(S) 24571

04 OIL SHALES AND TAR SANDS

REFER ALSO TO CITATION(S) 23762

23078 **(DOE/IG—123) Project management in the oil shale program.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 5 Sep 1980. 49p. TIC. Order Number DE83006321.

Report to the Secretary, Deputy Secretary.

A number of project-management issues work found in the DOE shale program which, if addressed and resolved, could lead to improved management of oil shale projects. Findings were: the oil-shale program was using technical project officiers with limited responsibilities rather than more broadly oriented project managers to manage projects; Laramie's limit on contract authority was not sufficiently high to develop experienced project managers; reporting requirements in cooperative oil-shale projects resulted in the transmission of unnecessarily detailed information to Headquarters; number of personnel directly involved in managing oil-shale projects at Laramie may have been inadequate; and the oil-shale program has not gained experience with the DOE's process for major systems acquisitions. Recommendations are given. Comments to the draft report are appended. (PSB)

23079 **(DOE/IG—124) Dissemination of technical information from the oil-shale program.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 3 Sep 1980. 34p. TIC. Order Number DE83006322.

Report to the Secretary, Deputy Secretary.

Auditors found cause to believe that DOE was not receiving technical information from a jointly financed demonstration project in Colorado to produce shale oil means of the modified in-situ process. The governments right to use and disseminate technical information developed under the Cooperative Agreement is seen a a contractual right spelled out in the Agreement for cost sharing. Enforcement is necessary to lessen vulnerability to charges of subsidy of private research and development without adequate benefits to the public. This final report was prepared after sending the draft report to the Assistant Secretaries of Fossil Energy (FE) and of Resource Applications (RA) for comments. IG still takes issue with some of the comments by FE, which are attached. Comments by IR, also appended, point out operational changes at the DOE Technical Information Center, Oak Ridge, TN that will improve, its publication operations time.

23080 **(DOE/IG—125) Financial management in the oil-shale program.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 13 Aug 1980. 53p. TIC. Order Number DE83006323.

Report to the Secretary, Deputy Secretary.

Auditors found that substantial improvements are needed in the financial management of the major project in the Department of Energy's (DOE) Oil-Shale Program. The Department's Laramie Energy Technology Center did not have an adequate accounting system to provide accurate information on the financial status of the cooperative project with the Occidental Oil Shale Corporation. Findings concerned: need for an accounting system that provides accurate information on the amount of money paid out; need for a system for tracking project costs; insufficient funding for work obligated by the Laramie Technical Project Officer; crediting revenue received from oil sales; DOE credits for oil sales; arrangements for the purchase of the product oil separated from the Cooperative Agreement; monitoring of the project's cost and schedule; reporting variance analysis of financial information; cost proposals and vouchers insufficintly detailed; DOE notification of anticipated significant deviations from the current cost plan; ambiguous responsibility for paying for any cost overruns; and property control records not adequatly reflecting DOE's interest in fixed assets purchased under the Cooperative Agreement. Comments on the draft report containing proposed corrective actions are appended. (PSB)

0402 Site Geology And Hydrology

REFER ALSO TO CITATION(S) 23018, 23052, 23056, 23057, 23061, 23062, 23074

0403 Drilling, Fracturing, And Mining

REFER ALSO TO CITATION(S) 23073, 23076

23081 **(PB—83-144006) Surface mining of non-coal minerals, appendix II: mining and processing of oil shale and tar sands. Final report.** (National Academy of Sciences - National Research Council, Washington, DC (USA)). 1980. 240p. NTIS, PC A11/MF A01.

This report was prepared in response to a charge given in Section 709 of the Surface Mining Control and Reclamation Act of 1977, P.L. 95-87, namely: to make an in-depth study of current and developing technology for mining of oil shale and tar sands. The report includes comments on the relation of oil shale mining and processing to the Act's environmental provisions. These mineral deposits are described in relation to land, water, air, and biological resources. The report concerns oil shale in Colorado, Utah, and Wyoming, where it is most abundant. The study also describes tar sands of eastern Utah, where almost all the significant deposits are found.

0404 Oil Production, Recovery, And Refining

REFER ALSO TO CITATION(S) 23088, 23095, 23224

23082 **(SAND—82-2699) Oil-shale Program. Twenty-sixth quarterly report, April 1982-June 1982.** Hommert, P.J. (ed.). (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 46p. NTIS, PC A03/MF A01. Order Number DE83008977.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The objective of this study is to acquire the ability to prescribe an efficient process for in situ recovery of a given oil shale resource. Progress reports are presented for the following tasks: bed preparation and characterization; retorting process; and structural stability. Some of the highlights for this quarter are: a number of small scale fracturing experiments were conducted at the Anvil Points Mine primarily for instrumentation evaluation; computational approaches for linking the explosive fracturing phase of bed preparation with the final void distribution have been developed, and a motion code BUMP has been tested on simple cratering geometry blasts; a series of tracer tests conducted on the LETC 150 ton retort provided an opportunity to calibrate fully the multi-gas multi-channel tracer system as a rubble bed evaluation tool; data acquisition and analysis were continued on Occidental's retorts 7 and 8 where extimates of shale processed and net oil produced were obtained by real time using the material balance technique. 32 figures. (ATT)

23083 **Oil shale retorting and combustion system.** Mei, J.S.; Pitrolo, A.A.; Shang, J.Y. (to Dept. of Energy). US Patent 4,373,454. 15 Feb 1983. Filed date 28 Aug 1981. vp. PAT-APPL-297307.

The present invention is directed to the extraction of energy values from oil shale containing considerable concentrations of calcium carbonate in an efficient manner. The volatiles are separated from the oil shale in a retorting zone of a fluidized bed where the temperature and the concentration of oxygen are maintained at sufficiently low levels so that the volatiles are extracted from the oil shale with minimal combustion of the volatiles and with minimal calcination of the calcium carbonate. These gaseous volatiles and the calcium carbonate flow from the retorting zone into a freeboard combustion zone where the volatiles are burned in the presence of excess air. In this zone the calcination of the calcium carbonate occurs but at the expense of less btu's than would be required by the calcination reaction in the event both the retorting and combustion steps took place simultaneously. The heat values in the products of combustion are satisfactorily recovered in a suitable heat exchange system.

23084 **Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels.** Wilson, M.F. Ottawa, Ontario; Canada Centre for Mineral and Energy Technology (Nov 1981). 33p. (CANMET—82-2E). CANMET, 555 Booth Street, Ottawa, Ontario. Order Number DE83901692.

Increased production from oil sands and heavy crude deposits is expected in Canada during the next two decades. Current processes for upgrading Athabasca bitumen produce synthetic crudes of such high aromatics content that diesel and jet fuels produced from oil sand distillates do not meet current specifications. It is expected that the increasing demand for these fuels will exert pressure on existing refineries and some relaxation of specifications in Canada is anticipated. Doubts also exist regarding the burnability of heating fuels from synthetic crudes. Some progress is expected in future upgrading methods and in downstream refining. However, research and development in new process technologies will be required in order to solve these problems. 7 figures, 6 tables.

0405 Properties And Composition

REFER ALSO TO CITATION(S) 22994, 23084

23085 **(DOE/LC/10910—T1) Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center.** (Foster Wheeler Synfuels Corp., Livingston, NJ (USA)). Mar 1983. Contract AC20-82LC10910. 180p. NTIS, PC A09/MF A01. Order Number DE83008498.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Analytical tests were performed on six samples of raw oil shale, two identified as Eastern, two identified as Colorado and the remaining two as Utah. This report covers the following aspects of this study: testing methods; sample preparation for specific tests; overall analytical summary tabulation; conclusions; specific enthalpy results; thermogravimetric analysis results; slag viscosity results; ash fusion temperature results; gross heating value results; elemental analysis results; and mineral analysis results. Procedures for drop calorimetry thermogravimetric analysis, differential thermal analysis and viscosity measurements are provided in the appendices. (ATT)

23086 **(UCRL—88908) Occurrence of biomarkers in Green River shale oil.** Singleton, M.F.; Burnham, A.K.; Richahrdson, J.H.; Clarkson, J.E. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 29p. (CONF-830303—12). NTIS, PC A03/MF A01. Order Number DE83009245.

From 185. American Chemical Society national meeting; Seattle, WA, USA (20 Mar 1983).

Portions are illegible in microfiche products.

Biological markers, compounds derived essentially unchanged from living organisms, are found in oil-bearing rocks, petroleum and most ancient sediments. We are investigating the vari-

ation in ratios of certain biomarkers in shale oils and their use as tracers for relating oil to source rock during in-situ retorting. We have produced oil samples at heating rates of about 10°C/min from 1- and 2-foot shale composites from three Green River formation cores and have measured the occurrence of several isoprenoid and polycycloalkane compounds in the oils using capillary gas chromatography. To eliminate the effect of heating rate on alkene/alkane ratios, we used the sum of ene and ane forms where applicable to calculate ratios. Variations in biomarker content with depth, grade, odd/even ratios, normal alkene/alkane ratios and atomic nitrogen/organic carbon ratios were studied and cross correlations were determined. Correlations were particularly high between pairs of isoprenoid compounds. There is sufficient variation to use biomarkers as retort diagnostics and to demonstrate a variation in source material.

0407 Health And Safety

REFER ALSO TO CITATION(S) 23089, 23094

23087 (DOE/LC/10787—111, pp 210-227) **Industrial safety and health.** Mar 1983. NTIS, PC A12/MF A01. Order Number DE83007887.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record.

The industrial safety and health program for the research and development facility will be designed to comply with requirements of the DOE/GKI cooperative agreement No. DE-FC20-78LC10787. The purpose of the program is to ensure safe and healthful working conditions for working men and women at the Kamp Kerogen site, and to comply with the provisions of section D2.05 of the ERP Program Outline.

0409 Waste Research And Management

23088 (CONF-820441—6) **Activated-sludge treatment and organic characterization of oil shale retort water.** Torpy, M.F.; Luthy, R.G.; Raphaelian, L.A. (Argonne National Lab., IL (USA); Carnegie-Mellon Univ., Pittsburgh, PA (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83007823.

From 15. oil shale symposium; Golden, CO, USA (27 Apr 1982).

Portions are illegible in microfiche products.

A sample of Oxy-6 retort water was analyzed for its organic composition and evaluated for response to treatment by combinations of ammonia stripping and ozonation. This was followed by activated-sludge treatment with and without powdered activated carbon (PAC). Biological treatment of both raw and ammonia-stripped influents without the addition of PAC resulted in dispersed and poorly settlable biological growth and poor process stability. It was concluded that biological treatment of full-strength raw or ammonia-stripped oil shale retort water was not practical. Stable biological oxidation could be established when preceded by ammonia stripping and ozonation. However, problems of dispersed and low biological growth also persisted in this process. 1 figure, 5 tables.

0410 Enviromental Aspects

23089 (DOE/LC/10787—111) **Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record.** Lundberg, D.A.; Sharrer, W.L.; Spradlin, H.K.L. (Geokinetics, Inc., Salt Lake City, UT (USA)). Mar 1983. Contract FC20-78LC10787. 266p. NTIS, PC A12/MF A01. Order Number DE83007887.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report details the results of environmental research performed between January 1980 and January 1982 on horizontal in-situ oil shale retorting at Geokinetics (DOE/GKI). Discussion is presented under the headings: atmospheric resource research; hydrologic resource research; ecological resource research; cultural-economic resource research; environmental permits; industrial safety and health; and risk assessment and mitigration. This report is a highly functional consolidated record of actual research conducted at the DOE/GKI research site. A summary report of activities between 1977 and 1979 is included. Separate abstracts have been prepared for each main heading section of the report for inclusion in the Energy Data Base. (DMC)

23090 (DOE/LC/10787—111, pp 22-75) **Atmospheric resource research.** Mar 1983. NTIS, PC A12/MF A01. Order Number DE83007887.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record.

The overall purpose of atmospheric resource research is to: (1) characterize and evaluate existing meteorological conditions of the research project area; (2) evaluate any trends with the locale; and (3) monitor for possible project-induced changes in the local microclimate. A nework of meteorological stations, consisting of six small instrument sheds and/or platforms housing mechanical instrumentation and two electrical weather stations (meteorological towers), has been established at the project site and is designed to continuously record on-site meteorological data. The meteorological stations, the instruments at each station, and the related parameters to be measured are described. Station locations are shown on maps. The purpose of atmospheric resource research is to: (1) determine the nature and extent of any gaseous pollutants contained within the various effluent streams; (2) determine the types of emission control devices and methods suitable for use with the process at current research and development project levels and eventually at commercial project levels; and (3) identify and eliminate conditions that could evolve to a level where certain pollutants might exceed standards protective of human and/or environmental health. To meet the above goals, the air quality research is divided into three categories: process gas; stack gas; and fugitive emissions. Therefore, the research activities within these three categories are extensions of sections A2.03 through A2.05 of the ERP Program Outline. Section A2.05 of the ERP Program Outline identifies and discusses additional potential ambient air studies. However, it should be noted that certain aspects of the ambient air studies as presented in Section A2.05 of the Program Outline are incorporated into the separate process and gas studies contained within this Section (A.2).

23091 (DOE/LC/10787—111, pp 76-138) **Hydrologic resource research.** Mar 1983. NTIS, PC A12/MF A01. Order Number DE83007887.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record.

Hydrologic resource research at Geokinetics' development facility is designed to develop an understanding of the effect of in situ retorting activities and/or its products upon the local hydrologic system for the purpose of: (1) developing mitigation measures, if necessary, to counteract any detrimental affects to the public or the environment; and (2) comply with the conditions set forth in existing permits, or generate information for the attainment of future permits under the following regulations: (1) Clean Water Act (33 U.S.C. 1251-1376; 40 CFR 6, 122, 125, 133); (2) Utah Water Pollution Control Act (Utah Code Annotated, 1953, Title 73, Chapter 14, as amended); and (3) Utah Mined Reclamation Act (Utah Code Annotated 1953). In order to fulfill this purpose, the following goals have been set forth in the ERP program outline: (1) characterize, identify and quantify the chemical constituents in surface water, groundwater, process water, and leached water; (2) determine the configuration of the geological framework that will be affected by the retorting process or which may be open to contamination by the retort effluent; (3) assess the changes to natural water movement that may be caused by process operations and the significance of such changes; and (4) determine the environmental fate and significance of solutes released to surface and subsurface

waters. To achieve these goals, hydrologic resource research was divided into three categories: (1) Water Quality; (2) Effluent Water; and (3) Hydrologic Characterization. Each category is discussed separately.

23092 (DOE/LC/10787—111, pp 139-182) **Ecological resource research.** Mar 1983. NTIS, PC A12/MF A01. Order Number DE83007887.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record.

Ecological resource research at Geokinetics' development facility will be designed to develop an understanding of the effect of in situ retorting activities and/or its products upon the local ecological environment for the purpose of: (1) development of sound land rehabilitation techniques in order to return the land to its original condition or better, so that past use of the land will continue; and (2) comply with the conditions set forth in existing permits, or generate information for the attainment of future permits under the Utah Land Reclamation Act (Utah Code Annotated 1953). In order to fulfill this purpose, the following goals have been set forth in the ERP program outline. (1) Develop a thorough understanding of the local ecological system so that: the land can be returned, concurrently with mining or within a reasonable amount of time thereafter to a stable ecological condition compatible with past, present and probable future land uses; on-site or off-site environmental degradation to the ecologic and hydrologic regimes caused by retorting operations will be minimized, and to meet pertinent state and federal regulations regarding land, air, and water quality standards and health and safety criteria; and future hazards to public safety and welfare will be minimized. With this goal in mind, the following objectives have been set: (1) develop a solid understanding of the local ecosystem interrelationships, that is, its structure and function; (2) define the operational and post operational ecological impacts which can occur as a result of in situ retorting activities and implement measures to mitigate those impacts; and (3) develop and implement effective land rehabilitation procedure for areas disturbed by operational activities. Under land rehabilitation research vegetation, soils and revegetation studies will be conducted. Wildlife research will consist of baseline and site monitoring studies.

23093 (DOE/LC/10787—111, pp 183-188) **Cultural-economic resource research.** Mar 1983. NTIS, PC A12/MF A01. Order Number DE83007887.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record.

In order to fulfill the overall purpose of cultural-economic resource research, the following specific goals have been set forth in the ERP Program Outline: (1) locate and identify historical resources that may exist on land used by Geokinetics; (2) determine the relative value or significance of these resources; and (3) take appropriate measures to preserve or protect important resources. Locating and identifying historical resources that may exist on a site is achieved by the following procedures: (1) consult national and state historical registers to determine if any such resources have already been identified and recorded; (2) consult the Utah Division of State History (a) to obtain known information about the site and historical resources likely to exist on it, and (b) to obtain permits and clearances needed to conduct further study or process operations; (3) direct inquiries to local persons familiar with the area in question to obtain information about the site and historical resources likely to exist on it; and (4) commission surface surveys by qualified parties approved by the Division of State History prior to operations having potential for resource disturbance. Preserving or protecting important resources will be achieved by consulting with the Division of State History to design and implement preservation or protection measures appropriate to the value of the resource. These measures may include strategies to avoid or mitigate disruption or destruction, state-supervised excavation of the resource, non-development of the specific site involved.

23094 (DOE/LC/10787—111, pp 228-242) **Risk assessment and mitigation.** Mar 1983. NTIS, PC A12/MF A01. Order Number DE83007887.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record.

This section has been instituted to provide an overt forum to periodically examine the environmental research program data base in an integrative light. A meeting of all environmental personnel and other interested parties will be held semiannually. A review of the research results from the previous six months will be given and an effort will then be made to identify previously unforeseen environmental problems occasioned by normal process operations, changes to process operations, and potential process failures or accidents. Problems identified will be dealt with by instituting new research programs, if necessary, assessing the impact potential of the problem and devising and implementing appropriate mitigation measures.

0420 Regulations

REFER ALSO TO CITATION(S) 23081

23095 (DOE/LC/10787—111, pp 190-209) **Environmental permits.** Mar 1983. NTIS, PC A12/MF A01. Order Number DE83007887.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record.

Major Federal environmental, health and safety laws applicable to oil shale development include: National Environmental Policy Act of 1969; Clean Air Act and Amendments of 1977; Federal Water Pollution Control Act Amendment of 1972; Occupational Safety and Health Act of 1970; Toxic Substances Control Act of 1976; Resource Conservation and Recovery Act of 1976; Clean Water Act of 1977; and Safe Drinking Water Act. In addition, state and local laws and rules will be applicable to each individual project. Consequently, a number of Federal, state and local agency permits and approvals will be required to implement any oil shale development program. A summary of some of the potential permits and approvals which may be required from the various governmental agencies to implement an oil shale development is provided. Comments pertinent to specific permits/approvals are also provided.

05 NUCLEAR FUELS

0501 Reserves

23096 **(DOE/ER/04972—4) Microcracks and energy. Progress report, 1 March 1982-28 February 1983.** Simmons, G. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Earth and Planetary Sciences). 1 Mar 1983. Contract AC02-78ER04972. 52p. NTIS, PC A04/MF A01. Order Number DE83008999.

Portions are illegible in microfiche products.

During the past 12 months, we worked mainly on the relation of microcracks to the transport of uranium and REEs. We have obtained polished thin sections of the samples of Conway and Mount Osceola granites from the Redstone Quarry (NH) and the Sherman granite from Wyoming. The location of U is determined from the induced fission tracks as photographed in a lexan detector through an optical microscope with transmitted light. The location of microcracks and their sealing minerals is determined with backscattered electrons in the scanning electron microscopy (SEM). The two locations can be correlated now with an uncertainty of about 10 μ. The uncertainty in our previous work (which had been done on roughly polished surfaces) was about 75 μ. We have now documented spatial correspondence between the location of uranium and microcracks sealed with minerals containing REEs as well

as other minerals. We have also examined the relation between uranium and tin mineralization in wall rock, Carnmenellis granite, from the Geevor Mine in Cornwall, England.

23097 **(PB—83-136358) Effects of moisture on radon emanation including the effects on diffusion. Open file report oct 79-Nov 81.** Thamer, B.J.; Nielson, K.K.; Felthauser, K. (Ford, Bacon and Davis Utah, Inc., Salt Lake City (USA)). Nov 1981. 214p. NTIS, PC A10/MF A01.

Radon emanation coefficients of 0.02 to 0.55 were measured at moisture contents ranging from dry to saturation in 18 different ores. The emanation coefficients rose from a minimum when dry to a plateau usually starting at 5 to 20 percent of saturation. A model, using measured pore-size distributions, suggested that the radium mineralization may be confined to annular layers about 0.02 micrometers thick around pores. Radon's diffusion coefficient was determined as a function of moisture. The techniques involved comparing a disk's exhalation as a function of time whether or not the disk had a distributed source. The model was free of approximations and included the effects of porosity and adsorption. An increase of diffusion coefficient with moisture for one or two ores was explained in terms of a model's equation for the diffusion coefficient in terms of both volume and surface diffusion. Radon's adsorption coefficient was determined on a uranium ore.

0502 Exploration

23098 **(GJBX—376(81)) Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation.** Shettel, D.L. Jr.; Langfeldt, S.L.; Hardy, L.C.; D'Andrea, R.F. Jr.; Zinkl, R.J.; Hensley, W.K.; Thomas, G.J.; Martell, C.J.; Maassen, L.W. (comps.). (Bendix Field Engineering Corp., Grand Junction, CO (USA); Los Alamos National Lab., NM (USA)). Nov 1981. Contract AC13-76GJ01664. 56p. NTIS, PC A04. Order Number DE82011154.

Paper copy only, copy does not permit microfiche production.

This report presents results of a Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the Bradfield Canal NTMS quadrangle, Alaska. In addition to this abbreviaed data release, more complete data are available to the public in machine-readable form. These machine-readable data, as well as quarterly or semiannual program progress reports containing further information on the HSSR program in general, or on the Los Alamos National Laboratory (LANL) portion of the program in particular, are available from DOE's Technical Library at its Grand Junction Area Office. Presented in this data release are location data, field analyses, and laboratory analyses of several different sample media. For the sake of brevity, many field site observations have not been included in this volume; these data are, however, available on the magnetic tape. Appendices A and B describe the sample media and summarize the analytical results for each medium. The data have been subdivided by one of the Los Alamos National Laboratory sorting programs of Zinkl and others (1981a) into groups of stream-sediment and lake-sediment samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements have been included in this report. Also included are maps showing results of multivariate statistical analyses. Information on the field and analytical procedures used by the Los Alamos National Laboratory during sample collection and analysis may be found in any HSSR data release prepared by the Laboratory (see, for example, Planner and others, 1981), and will not be included in this report.

23099 **(GJBX—377(81)) Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesna NTMS quadrangle, Alaska. National Uranium Resource Evaluation.** Hardy, L.C.; D'Andrea, R.F. Jr.; Zinkl, R.J.; Shettel, D.L. Jr.; Langfeldt, S.L.; Garcia, S.R.; Hanks, D.; George, W.E.; Boliver, S.L. (comps.). (Bendix Field Engineering Corp., Grand Junction, CO (USA); Los Alamos National Lab., NM (USA)). Nov 1981. Contract AC13-76GJ01664. 45p. NTIS, PC A03. Order Number DE82007982.

Paper copy only, copy does not permit microfiche production.

This report presents results of a Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the Nabesna NTMS quadrangle, Alaska. In addition to this abbreviated data release, more complete data are available to the public in machine-readable form. These machine-readable data, as well as quarterly or semiannual program progress reports containing further information on the HSSR program in general, or on the Los Alamos National Laboratory (LANL) portion of the program in particular, are available from DOE's Technical Library at its Grand Junction Area Office. Presented in this data release are location data, field analyses, and laboratory analyses of several different sample media. For the sake of brevity, many field site observations have not been included in this volume; these data are, however, available on the magnetic tape. Appendices A and B describe the sample media and summarize the analytical results for each medium. The data have been subdivided by one of the Los Alamos National Laboratory sorting programs of Zinkl and others (1981a) into groups of stream-sediment, lake-sediment, stream-water, lake-water, and ground-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements have been included in this report. Also included are maps showing results of multivariate statistical analyses. Information on the field and analytical procedures used by the Los Alamos National Laboratory during sample collection and analysis may be found in any HSSR data release prepared by the Laboratory (see, for example, Planner and others, 1981), and will not be included in this report.

23100 **(GJBX—378-81) Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation.** Hardy, L.C.; D'Andrea, R.F. Jr.; Zinkl, R.J.; Shettel, D.L. Jr.; Langfeldt, S.L.; Minor, M.M.; McInteer, C.; Hansel, J.N.; Broxton, D.E. (Bendix Field Engineering Corp., Grand Junction, CO (USA); Los Alamos National Lab., NM (USA)). Nov 1981. Contract AC13-76GJ01664. 59p. NTIS, PC A04. Order Number DE82007981.

Paper copy only, copy does not permit microfiche production.

This report presents results of a Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the Limon NTMS quadrangle, Colorado. In addition to this abbreviated data release, more complete data are available to the public in machine-readable form. These machine-readable data, as well as quarterly or semiannual program progress reports containing further information on the HSSR program in general, or on the Los Alamos National Laboratory (LANL) portion of the program in particular, are available from DOE's Technical Library at its Grand Junction Area Office. Presented in this data release are location data, field analyses, and laboratory analyses of several different sample media. For the sake of brevity, many field site observations have not been included in this volume, these data are, however, available on the magnetic tape. Appendices A and B describe the sample media and summarize the analytical results for each medium. The data have been subdivided by one of the Los Alamos National Laboratory sorting programs of Zinkl and others (1981a) into groups of stream-sediment, lake-sediment, stream water, lake water, and ground-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements have been included in this report. Also included are maps showing results of multivariate statistical analyses. Information of the field and analytical procedures used by the Los Alamos National Laboratory during sample collection and analysis may be found in any HSSR data release prepared by the Laboratory (see, for example, Planner and others, 1981) and will not be included in this report.

0503 Mining

23101 **(PB—83-138859) In-place leaching of uranium, copper, and evaporites.** Carnahan, T.G. (Bureau of Mines, Reno, NV (USA). Reno Research Center). Nov 1982. 34p. NTIS, PC A03/MF A01.

The purpose of this report is to discuss in-place leaching technology in the United States. Application of in-place leaching to

uranium ores has been particularly successful. The sandstone ores are contained above and below by impermeable shales and the uranium ore minerals are easily leached with oxidizing acid or base solutions. Copper is recovered from subgrade rock by dump or in-place leaching acidified ferric sulfate solutions. The leaching solution migrates down through the rock and dissolves copper. The solution is collected from the base of the dumps and copper is recovered by solvent extraction, electrowinning, or by cementation on detinned steel cans. Solution mining of evaporites is being conducted commercially for the extraction of sodium chloride and potassium chloride.

23102 **(REG/G—3.46) Standard format and content of license applications, including environmental reports, for in-situ uranium solution mining.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research). Jun 1982. 47p. NTIS, PC A03/MF A01 - GPO. Order Number DE83900927.

This guide is intended to provide instructive guidance. It should not be considered as a substitute for a careful evaluation of a program proposed by an applicant. Information not specifically discussed in this guide should be included in the application if it is a part of an applicant's proposed or existing operations or health and safety or environmental protection program. In some cases, information discussed in this guide may not be appropriate or necessary depending on site-specific characteristics and circumstances. In those cases, an applicant should describe why the information is not necessary or appropriate. An incomplete application will result in processing delay and may result in the rejection of a license application. Changes to existing licensed activities and conditions require the issuance of an appropriate license amendment. An applicant for such an amendment should describe the proposed changes in detail and should discuss the potential environmental and health and safety impacts, using the appropriate sections of this document for guidance.

0505 Enrichment

23103 **(K/OA—5424) Green's function for Onsager's pancake equation.** Berger, M.H. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). Feb 1983. Contract W-7405-ENG-26. 17p. NTIS, PC A02/MF A01. Order Number DE83009281.

Portions are illegible in microfiche products.

A Green's function has been derived for Onsager's one-dimensional pancake equation for the approximate internal flow in a gas centrifuge. Our new, exact solution has been verified by comparison with a previous solution for the flow induced by a point source of axial momentum. The qualitative character of the solution is illustrated in an example where the position of the source point is varied.

0506 By-products

REFER ALSO TO CITATION(S) 23101

23104 **(AD-A—121588/8) Depleted uranium test range fragment reclamation. Final report Nov 81-Jun 82.** Walz, M.J. (Nuclear Materials, Inc., Concord, MA (USA)). Jul 1982. 14p. NTIS, PC A02/MF A01.

This report summarizes the efforts of a two-phase program aimed at reclaiming depleted uranium (DU) alloy fragments generated from the testing of GAU-8 penetrators at Eglin Air Force Base, Florida. Phase I developed methods of separating, cleaning, and melting the DU fragments. Four separate melting and casting heats were made and evaluated. Excellent chemical quality was established and the casting yields were better than 97 percent. Phase II efforts manufactured 150 GAU-8 penetrators of acceptable quality from the material reclaimed in Phase I. Acceptable commercial products were also cast from the reclaimed DU alloy to demonstrate an additional application for the material.

23105 **(PNL-SA—11163) Potential for large-scale uses for fission-product Xenon.** Rohrmann, C.A. (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 7p. (CONF-830205—21). NTIS, PC A02/MF A01. Order Number DE83007875.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

Of all fission products in spent, low-enrichment-uranium power-reactor fuels, xenon is produced in the highest yield - nearly one cubic meter, STP, per metric ton. In aged fuels which may be considered for processing in the US, radioactive xenon isotopes approach the lowest limits of detection. The separation from accompanying radioactive ^{85}Kr is the essential problem; however, this is state-of-the-art technology which has been demonstrated on the pilot scale to yield xenon with pico-curie levels of ^{85}Kr contamination. If needed for special applications, such levels could be further reduced. Environmental considerations require the isolation of essentially all fission-product krypton during fuel processing. Economic restraints assure that the bulk of this krypton will need to be separated from the much-more-voluminous xenon fraction of the total amount of fission gas. Xenon may thus be discarded or made available for uses at probably very low cost. In contrast with many other fission products which have unique radioactive characteristics which make them useful as sources of heat, gamma and x-rays, and luminescence - as well as for medicinal diagnostics and therapeutics - fission-product xenon differs from naturally occurring xenon only in its isotopic composition which gives it a slightly hgiher atomic weight, because of the much higher concentrations of the ^{134}Xe and ^{136}Xe isotopes. Therefore, fission-product xenon can most likely find uses in applications which already exist but which can not be exploited most beneficially because of the high cost and scarcity of natural xenon. Unique uses would probably include applications in improved incandescent light illumination in place of krypton and in human anesthesia.

0507 Fuels Production And Properties

23106 **(DOE/ET/34026—6) Sphere-pac fuel development program. Semi-annual progress report, April 1982-September 1982.** Kilian, D.C.; Koegler, S.S.; Gerrald, L.D. (Exxon Nuclear Co., Inc., Richland, WA (USA)). Dec 1982. Contract AC06-79ET34026. 64p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83008432.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Progress made by Exxon Nuclear Company, Inc. toward developing processes fabricating spherical particle (sphere-pac) nuclear fuel is reported for the period April 1982 through September 1982. The objective of the program is to convert a series of batch laboratory operations, developed at Oak Ridge National Laboratory, into continuous process suitable for commercial application. The program has moved through the phases of tehcnology review, pilot plant construction, testing of unit operations and equipment development. Process parameters for producing high quality UO_2 spheres with >98% theoretical density have been established. Scaled-up continuous equipment has been installed and demonstrated to produce large (1200μ) and medium (300μ) size UO_3 spheres at the rate of 100 kg U/day. A prototype continuous process for producing fine (<45μ) spheres has been demonstrated. The conceptual design of a 1.0 MTU/day Sphere-Pac Fuel Production Facility is in progress.

23107 **Mixed uranium dicarbide and uranium dioxide microspheres and process of making same.** Stinton, D.P. (to Dept. of Energy). US Patent 4,367,184. 4 Jan 1983. Filed date 17 Dec 1980. vp.

PAT-APPL-217356.

Nuclear fuel microspheres are made by sintering microspheres containing uranium dioxide and uncombined carbon in a 1 mole percent carbon monoxide/99 mole percent argon atmosphere at 1550° C and then sintering the microspheres in a 3 mole per carbon monoxide/97 mole percent argon atmosphere at the same temperature.

23108 Production of spherical UO/sub 2/-UC/sub 2/ for nuclear fuel applications using thermochemical principles. Stinton, D.P.; Lackey, W.J.; Spence, R.D. (Oak Ridge Natl Lab, TN, USA). *Journal of the American Ceramic Society;* 65: No. 7, 321-324(Jul 1982).

A process for the fabrication of uranium dioxide-uranium dicarbide microspheres for use as an advanced nuclear fuel is described. The uranium-carbon-oxygen phase diagram was used extensively in applying thermochemical principles to the combined process of uranium carbide synthesis and kernel sintering. A procedure was developed to convert urania plus carbon microspheres produced by a wet-chemical gelation process to a highly dense UO/sub 2/-UC/sub 2/ product. 22 refs.

23109 Eh and fission product solubilities: two factors in the leaching of UO_2. Ogard, A.E.; Duffy, C.J. (Los Alamos National Lab., NM). *Nuclear and Chemical Waste Management;* 2: 169-171(1981).

Eh was found to have a large effect on the dissolution of UO_2 in water at pH 4. As was estimated from thermodynamic data, the solubility was found to decrease as the oxygen fugacity, and therefore the Eh of the water, was decreased. Some of the rare earths and other actinides such as europium, cerium, americium, and plutonium released during the leaching of a spent fuel element behaved differently. These elements were not affected to any large extent by the variation in Eh of these experiments. It has been postulated that these elements reached their solubility limits and precipitated as the spent fuel was leached. 2 figures, 2 tables.

0508 Spent Fuels Reprocessing

REFER ALSO TO CITATION(S) 23163, 23173, 23463, 23519, 24070

23110 (ANL/NESC—956R) CONSEPT; controller-run solvent extraction. Malinauskas, A.P. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048956.

Maximum of - 100 stages.

The program simulates the solvent extraction process used in the reprocessing of nuclear fuel, and, in particular, the actions of automatic process controllers in the solvent extraction system. The program can presently handle the Purex and Thorex processes, but the program can be modified easily to handle other solvent extraction processes.IBM3033,360,370; FORTRAN IV (98%) and BAL (2%); OS/MVS or OS/MVT; The program requires 180K bytes of memory for execution..

23111 (ANL/NESC—959) PUBG; purex solvent extraction process model. Geldard, J.F.; Beyerlein, A.L. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048959.

Maximum of - 100 mixer-settler stages All feed streams enter the contactor through the mixers, with only one feed stream of each phase able to enter a mixer. All product streams exit the contactor from the settlers, with only one product stream of each phase able to exit a settler.

PUBG is a chemical model of the Purex solvent extraction system, by which plutonium and uranium are recovered from spent nuclear fuel rods. The system comprises a number of mixer-settler banks. This discrete stage structure is .the basis of the algorithms used in PUBG. The stages are connected to provide for countercurrent flow of the aqueous and organic phases. PUBG uses the common convention that has the aqueous phase enter at the lowest numbered stage and exit at the highest one; the organic phase flows oppositely. The volumes of the mixers are smaller than those of the settlers. The mixers generate a fine dispersion of one phase in the other. The high interfacial area is intended to provide for rapid mass transfer of the plutonium and uranium from one phase to the other. The separation of this dispersion back into the two phases occurs in the settlers. The species considered by PUBG are Hydrogen (1+), Plutonium (4+), Uranyl Oxide (2+), Plutonium (3+), Nitrate Anion, and reductant in the aqueous phase and Hydrogen (1+), Uranyl Oxide (2+), Plutonium (4+), and TBP (tri-n-butylphosphate) in the organic phase. The reductant used in the Purex process is either Uranium (4+) or HAN (hydroxylamine nitrate).IBM3033;CDC CYBER175; FORTRAN IV; OS/MVS or OS/MVT (IBM3033), NOS 1.3 (CDC CYBER175); The IBM3033 version requires 150K bytes of memory for execution; 62,000 (octal) words are required by the CDC CYBER175 version..

23112 (DOE/NE—0049) US Department of Energy comments on the paper entitled "Bubble, bubble, toil and trouble: reprocessing nuclear spent fuel". (USDOE Assistant Secretary for Nuclear Energy, Washington, DC. Office of Spent Fuel Management and Reprocessing Systems). Mar 1983. 70p. NTIS, PC A04/MF A01. Order Number DE83008476.

Makhijani's paper titled Bubble, Bubble, Toil, and Trouble: Reprocessing Nuclear Spent Fuel was published on July 20, 1982, by the Health and Energy Learning Group, a recently formed environmental/anti-nuclear organization. The high level of interest by the press in reporting the erroneous statement and conclusions developed in the paper has prompted DOE to prepare the analysis, which is based on a thorough review of the issues including comments from representatives of foreign governments responsible for specific reprocessing operations cited in the paper, and comments from experts within the reprocessing community in the United States. This review has established numerous factual errors in the paper by the Health and Energy Learning Group, as well as errors of analysis. These are reviewed on a case-by-case basis.

23113 (DP-tr—37) Behavior of ruthenium during reprocessing of spent reactor fuel. Diana, J.J. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)). Feb 1977. Contract AC09-76SR00001. Translation of CEA-R—4813. 45p. NTIS MF A01. Order Number DE83007886.

Microfiche only, copy does not permit paper copy reproduction.

It is rather difficult to reduce the extractability of ruthenium. Reducing agents, such as hydrazine, cannot be utilized prior to the first cycle of U and Pu extraction. Oxidizing agents are only effective at low acidity. Citric acid, while very effective on the behavior of ruthenium and plutonium in 1N NHO_3, is less effective at stronger acidities. We must therefore find an appropriate complexing agent which is effective in 3N HNO_3 without modifying the extractability of U and Pu. It would also be worthwhile changing the diluent for TBP, and selecting one which is more resistant to hydrolysis and radiolysis.

0509 Transport And Storage

REFER ALSO TO CITATION(S) 23162, 24111, 24114

23114 (DOE/RL—83-1) Spent-fuel-storage requirements: an update of DOE/RL-82-1. (Department of Energy, Richland, WA (USA). Richland Operations Office). Jan 1983. Contract AC06-76RL01830. 85p. NTIS MF A01. Order Number DE83007991.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted.

Spent fuel storage requirements as projected through the year 2000 for US light water reactor (LWR) nuclear power plants were calculated using information supplied by the utilities reflecting plant status as of September 30, 1982. Projections through the year 2000 combined fuel discharge projections of the utilities with the assumed discharges of typical reactors required to meet the nuclear capacity of 132 gigawatts electrical (GWe) projected by the Energy Information Administration (EIA) for the year 2000. Three cases were developed and are summarized. A reference case, or maximum at-reactor (AR) capacity case, assumes that all reactor storage pools are increased to their maximum capacities, as estimated by the utilities, for spent fuel storage utilizing currently licensed technologies. Rod consolidation and dry storage technologies were not considered. The reference case assumes no transshipments between pools except as currently licensed by the Nuclear Regulatory Commission (NRC). This case identifies an initial requirement for 13 metric tons uranium (MTU) of additional storage in 1984, and a

cumulative requirement for 13,090 MTU additional storage in the year 2000. The reference case is bounded by two alternative cases. One, a current capacity case, assumes that only those pool storage capacity increases currently planned by the operating utilities will occur. The second, or maximum capacity with transshipment case, assumes maximum development of pool storage capacity as described above and also assumes no constraints on transshipment of spent fuel among pools of reactors of like type (BWR) within a given utility. In all cases, a full core discharge capability is assumed to be maintained for each reactor, except that only one FCR is maintained when two reactors share a common pool. 1 figure, 12 tables.

23115 **(DOE/SR/11018—T1) Rack test and facility enhancement program.** Anderson, R.T.; Cottrell, J.E.; Maddux, E.P. (Allied-General Nuclear Services, Barnwell, SC (USA)). Dec 1982. Contract AC09-82SR11018. 75p. NTIS, PC A04/MF A01. Order Number DE83008553.

This report presents the results of an evaluation and testing program for the high-density spent fuel rack designed under a previous contract with DOE. Prototype modules were fabricated and tested at the BNFP to evaluate the handling characteristics of the design and to prepare recommendations for further refinements. Prominent rack vendors prepared a fabricability analysis including cost, delivery schedule, and the identification of possible improvements to the design. In addition, selected design modifications were made to the Fuel Receiving and Storage Station to enhance the safety and operability of the fuel handling systems for ongoing research activities for future full-scale demonstration of the facility.

23116 **(DP-MS—80-115) Economics of spent LWR fuel storage.** Clark, H.J. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). 1980. Contract AC09-76SR00001. 10p. (CONF-801165—1). NTIS, PC A02/MF A01. Order Number DE83009413.

From IAEA advisory group specialist meeting on spent fuel storage alternatives; Las Vegas, NV, USA (17 Nov 1980).

A low cost option for spent fuel inventories would be to ship excess fuel from the overburdened reactor to another reactor in the utility's system that has available space. The only cost would be for cask leasing and shipping. Three other alternatives all require considerable capital expenditures: reracking, new at-reactor (AR) storage facilities, and away-from-reactor (AFR) storage facilities. Fuel storage requirements will be met best by transfer of fuel or by re-racking existing reactor basins whenever these options are available. These alternatives represent not only the lowest cost storage options but also the most timely. Fuel can be shipped to other storage pools for about $10/kg depending on the distance, while costs for reracking range from $18 to 25/kg depending on the approach. These alternatives are recognized to face environmental and regulatory obstacles. However, such obstacles should be less severe than similar issues that would be encountered with AR or AFR basin storage. When storage requirements cannot be met by the first two options, the next least costly alternative for most utilities will be use of a Federal AFR. Storage cost of about $137/kg at an AFR are less costly than charges of up to $350/kg that could be incurred by the use of AR basins. AR basins are practical only when a utility requires storage capacity to accommodate annual additions of 100 MT or more of spent fuel. The large reactor complexes discharging this much feul are not currently those that require relief from fuel storage problems. A recent development in Germany may offer an AR alternative of dry storage in transportation/storage casks at a cost of $200/kg; however, this method has not yet been accepted and licensed for use in the US.

23117 **(SAND—82-2681) RADTRAN II user guide.** Madsen, M.M.; Wilmot, E.L.; Taylor, J.M. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 137p. (TTC—0399). NTIS MF A01. Order Number DE83007990.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted . Includes 1 sheet of 48x reduction microfiche.

RADTRAN II is a flexible analytical tool for calculating both the incident-free and accident impacts of transporting radioactive materials. The consequences from incident-free shipments are apportioned among eight population subgroups and can be calculated for several transport modes. The radiological accident risk (probability times consequence summed over all postulated accidents) is calculated in terms of early fatalities, early morbidities, latent cancer fatalities, genetic effects, and economic impacts. Groundshine, inhalation, direct exposure, resuspension, and cloudshine dose pathways are modeled to calculate the radiological health risks from accidents. Economic impacts are evaluated based on costs for emergency response, cleanup, evacuation, income loss, and land use. RADTRAN II can be applied to specific scenario evaluations (individual transport modes or specified combinations), to compare alternative modes or to evaluate generic radioactive material shipments. Unit-risk factors can easily be evaluated to aid in performing generic analyses when several options must be compared with the amount of travel as the only variable.

0510 Marketing And Economics

REFER ALSO TO CITATION(S) 23032, 23116

0520 Waste Management

REFER ALSO TO CITATION(S) 23109, 23183, 23184, 23186, 23189, 24114, 24303, 24482, 24484, 24485

23118 **(BNL—51612) Solidification of oils and organic liquids.** Clark, D.E.; Colombo, P.; Neilson, R.M. Jr. (Brookhaven National Lab., Upton, NY (USA)). Jul 1982. Contract AC02-76CH00016. 31p. NTIS, PC A03/MF A01. Order Number DE83008474.

The suitability of selected solidification media for application in the disposal of low-level oil and other organic liquid wastes has been investigated. In the past, these low-level wastes (LLWs) have commonly been immobilized by sorption onto solid absorbents such as vermiculite or diatomaceous earth. Evolving regulations regarding the disposal of these materials encourage solidification. Solidification media which were studied include Portland type I cement; vermiculite plus Portland type I cement; Nuclear Technology Corporation's Nutek 380-cement process; emulsifier, Portland type I cement-sodium silicate; Delaware Custom Materiel's cement process; and the US Gypsum Company's Envirostone process. Waste forms have been evaluated as to their ability to reliably produce free standing monolithic solids which are homogeneous (macroscopically), contain $< 1\%$ free standing liquids by volume and pass a water immersion test. Solidified waste form specimens were also subjected to vibratory shock testing and flame testing. Simulated oil wastes can be solidified to acceptable solid specimens having volumetric waste loadings of less than 40 volume-%. However, simulated organic liquid wastes could not be solidified into acceptable waste forms above a volumetric loading factor of about 10 volume-% using the solidification agents studied.

23119 **(CONF-820303—44) Mathematical model for evaluating the suitability of a low-level radioactive waste site.** Gureghian, A.B.; Sedlet, J. (Argonne National Lab., IL (USA)). Feb 1982. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83008659.

From Waste management conference; Tucson, AZ, USA (8 Mar 1982).

A mathematical model intended to study the one-dimensional transport of radionuclides in a non-homogeneous soil system under saturated-unsaturated and isothermal conditions is presented. The model is composed of two modules: the first to calculate the pressure distribution enabling one to compute velocities and soil moisture; the second to calculate the migration of species by considering the major processes associated with the transport phenomena of a dissolved substance in porous media, i.e., advection, mechanical dispersion, molecular diffusion, radioactive decay, and sorption, assuming a linear equilibrium isotherm. The numerical method of solving both flow and solute equations used here is the finite-element method based on the weighted residual technique. The flow equation is solved by the Bubnov-Galerkin method. The solute equation is solved by a Petrov-Galerkin type method. The model allows for a variety of boundary conditions; e.g., infiltration, drainage and/or evaporation. A test case involving the movement

of a non-reacting ionic species is used to validate the model. Use of the model is illustrated by the analysis of the movement Sr-90 and Cs-137 and H-3 (as water) from a low-level solid-waste disposal trench subject to a steady rate of rainfall.

23120 **(CONF-8209104—2) Organizational approach to estimating public resistance at proposed disposal sites for radioactive and hazardous wastes.** Payne, B.A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 17p. NTIS, PC A02/MF A01. Order Number DE83008605.

From Annual meeting of the American Sociological Association; San Francisco, CA, USA (6 Sep 1982).

This paper was intended to present an organizational approach to predicting collective action and then to apply that approach to the issue of siting of a nuclear or other hazardous waste repository. Borrowing largely from two previously developed models (one by Perry et al. at Battelle's Human Affairs Research Center and one by Charles Tilly), I developed a theoretical model. Indicators were identified for many of the variables, but they are not easily measured, requiring a number of decisions on thresholds which were not clarified in the paper. What remains is further discussion of these measurement problems, evaluation of the confirmation status of the propositions, and empirical tests of the model. In the meantime, however, the discussion should provide assessors of public resistance with a theoretical basis for their thinking and a guide to some revealing indicators of the potential for collective action.

23121 **(DOE/ID/12348—T4) Comprehensive low-level waste management plan for the state of Kentucky. Fifth quarterly report for the period ending December 31, 1982.** Gregorio, S.B. (Kentucky Natural Resources and Environmental Protection Cabinet, Frankfort (USA)). Mar 1983. Contract FG07-81ID12348. 46p. NTIS, PC A03/MF A01. Order Number DE83008772.

Portions are illegible in microfiche products.

Progress accomplished during the quarter ending December 31, 1982 is summarized. Activities for the period have concentrated on working with the LLRW Management Coordination Group and participation in a workshop by the Northwest LLRW Regional Compact. The report contains an attachment entitled Managing Kentucky's Radioactive Waste Part I - Negotiations with Regional Low-Level Radwaste Compacts. The research program consists of 6 tasks: LLRW management unit; participation in meetings; coordination with other agencies; LLRW technology review; review alternative roles for Maxey Flats; and development of a comprehensive management plan. (DMC)

23122 **(DOE/LLW—19T) Massachusetts low-level radioactive-waste-management survey. National Low-Level Radioactive Waste Management Program.** (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 80p. NTIS, PC A06/MF A01. Order Number DE83009479.

Portions are illegible in microfiche products.

During 1982, Inter/Face Associates Inc., undertook the following tasks for the US Department of Energy's National Low-Level Waste Management Program: Task 1: In conjunction with EG and G Idaho, Inc., the Department of Energy's lead contractor for low-level waste management identified data needs for low-level waste management, and uses of the data; Task 2: Developed and pretested a management questionnaire to elicit the necessary data; Task 3: Assisted the Radiation Control Program of the Massachusetts Department of Public Health in fielding the management questionnaire; Task 4: Verified survey responses and entered the data on a computer system supplied by EG and G Idaho; and Task 5: Assisted EG and E Idaho in analyzing the data. This report documents activities undertaken by Inter/Face Associates in completing these tasks and presents results of data analyses.

23123 **(EGG—2236) Decontamination and decommissioning of TAN radioactive liquid-waste-evaporator system (PM-2A). Final report.** Smith, D.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 54p. NTIS, PC A04/MF A01. Order Number DE83009147.

This report describes the decontamination and decommissioning of the Test Area North (TAN) liquid waste evaporator (PM-2A). The PM-2A facility included the aboveground evaporator system, two underground holding tanks and feedlines, an electrical distribution subsystem, and one above ground concrete tank. Much surface soil of the PM-2A area was also radioactively contaminated. Stabilization of the liquid and sludge in the holding tanks, a major task, was achieved by pumping most of the liquid into 55-gal drums and mixing it with cement. The drums were buried in the Radioactive Waste Management Complex (RWMC). The remaining liquid and sludge were dried in place by layers of diatomaceous earth. The most contaminated surface soil was removed, and the area backfilled with clean topsoil and graded, reducing the surface radiation field to background. A 6-ft-high chain link fence now surrounds the area. Most of the area was seeded to crested wheatgrass. 46 figures, 9 tables.

23124 **(EGG-FM—6153) Leach tests of simulated low-level transuranic waste forms containing transuranic elements.** Welch, J.M.; Sill, C.W.; Flinn, J.E. (EG and G Idaho, Inc., Idaho Falls (USA)). Jan 1983. Contract AC07-76ID01570. 46p. NTIS, PC A03/MF A01. Order Number DE83009201.

Simulations of waste forms that could be produced by slagging pyrolysis incineration of low-level transuranic (TRU) wastes stored at the Idaho National Engineering Laboratory (INEL) have been fabricated containing the transuranic isotopes ^{237}Np, ^{239}Pu, ^{241}Am, and ^{244}Cm at levels of approximately 1 $\mu Ci/g$ of each. Leach tests were performed on frit; concrete monoliths made with frit and Portland cement; and vitrified monoliths of average INEL TRU waste, INEL soil, and simulated Rocky Flats plant sludge. Static leach tests were performed at 90, 70, 40, and 25°C in deionized water for up to 364 days. Leachates were analyzed for the TRU elements by alpha spectrometry. From the leaching results the following generalizations can be made: (1) cemented frit and vitrified sludge waste forms produce leachates with the highest pHs (> 11) and have the lowest TRU leach rates, 10^{-4} g/m^2 d at 90°C; (2) neptunium has a higher leach rate than the other three TRU elements by as much as two orders of magnitude for all waste forms tested except cemented frit; and (3) only the vitrified soil samples display a marked temperature dependence for leach rates of all four TRU elements.

23125 **(GSF-T—137) Summarized representation of the progress and results of the suitability test of the Konrad pit for final storage of radioactive wastes.** Brewitz, W. (Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Braunschweig (Germany, F.R.). Inst. fuer Tieflagerung). Jun 1982. 36p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750306.

The final report contains the description and results of all R + D-works carried out as part of the suitability test and, as far as possible, a statement following from this with regard to the possibilities of utilization and safety of the pit Konrad for final storage of radioactive wastes. The report includes essential elements of the 'plan' for the final storage to be installed. According to its character it is a research report representing all scientific and technical investigations as well as the complex interdisciplinary relations.

23126 (Juel-Conf—42(Vol.2), pp 540-557) **Overview on product forms.** Merz, E. Jun 1981. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

For the future development and optimization of methods and products a better integration of the container barrier including migration-impending filler materials seems to be important. Borosilicate glasses belong to the appropriate product forms for the ultimate storage, whereas crystallized synthetic rocks are still in the test stage. The testing of the SYNROC-products is on.

23127 (Juel-Conf—42(Vol.2), pp 558-575) **Development of the borosilicate glass for the vitrification plant PAMELA.** Lutze, W.; Schiewer, E.; De, A.K. Jun 1981. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

The glass development is not finished yet. Therefore the glass constituents SiO_2, B_2O_3, Al_2O_3 as well as alkali- and alkaline earth oxides and TiO_2 have not been quantified. 20 tons of glass have already been produced with simulated waste mixtures, and they have been tested in the HAW-ceramic-melter or in the inactive Pamela-vitrification plant.

23128 (Juel-Conf—42(Vol.2), pp 576-602) **Hydroxylated ceramic waste forms and the absurdity of 'leach tests'.** Roy, R. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

The repository pressure and temperature conditions during the thermal period projected in U.S. repositories have been drastically lowered in the last year or two to new values of say 175 +- 50 K. Using the argument that the evidence from natural models indicates the most stable mineral (= ceramic) hosts for radionuclides, one finds that under these new repository conditions such crystalline assemblages would be micas, clays, zeolites, and other hydrated minerals, plus the tetravalent anhydrous oxide families. A waste form consisting of specific hydroxylated candidate phase can be made via a simple in-can technology (demonstrated by Oak Ridge) by reacting liquid wastes with precursor gels or phyllo or tektosilicates at <200°C under modest pressure within the final disposal canister. The data on the rate of reaction of typical oxide materials to yield hydroxylated phases under these conditions show that the typical leach test (at 25-100°C in deionized water) does not provide a simulation of the reactions which will occur. Hence such tests are not only totally meaningless with respect to qualifying a waste form for its role in a repository, they can be downright misleading.

23129 (Juel-Conf—42(Vol.2), pp 603-620) **Criteria for high level waste disposal and characterization of barriers.** Pottier, P.; Sousselier, Y. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

It is essential to characterize the four different barriers and their behaviour in normal and accident condition for ultimate disposal of HLW. For the characterization the normal parametric characterization and the characterization in the reference condition of a disposal site can be used. The four barriers are the unsolubilization matrix (waste form), the packing, the geochemical barrier and the host rock.

23130 (Juel-Conf—42(Vol.2), pp 621-642) **Capacity of the borosilicate glass VG 98/12 for components of the high-level radioactive waste.** Saidl, J.; Kahl, L. Jun 1981. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

The maximum capacity of the borosilicate glass product GP 98/12 and the gadolinium-containing GP 98/26 has been studied for the HAW-elements and element groups Mo, Cr, Zr, Ce, U, Np, Pu, SO_4^{3-}, PO_4^{3-} and Cl^-. As the rules for a multi-component and variable system are unknown, only empiric investigations of the properties of the HAW-containing glass products were possible. The concentration of parasitic substances determines the capacity of the glass matrix for the whole HAW-substances.

23131 (Juel-Conf—42(Vol.2), pp 643-655) **FUETAP concrete - an alternative radioactive waste host.** Moore, J.G.; Rogers, G.C.; Dole, L.R.; Kessler, J.H.; Morgan, M.T.; Devaney, H.E. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

These tailored autoclaved concretes (FUETAP concentrates) offer a number of advantages as hosts for a wide variety of radioactive wastes. They are formed at low temperatures and pressures (100°C and 0.1 MPa) from readily available raw materials and require no new processing technology. The extreme latitude in concrete formulations ensures the acceptance of the gamut of waste materials. The leachability of nuclides from the resulting ceramic-like concretes is quite low with essentially no prospect of pressure build-up from long-term self-irradiation in the final storage containers. The solids are thermally stable up to at least 900°C. Additional studies are in progress to verify that FUETAP concretes are acceptable alternative waste hosts for defense, TRU, and commercial high-level radioactive waste.

23132 (Juel-Conf—42(Vol.2), pp 656-674) **Compared quantitative determination of nuclear waste glass crystallization rate by light microscopy and X-ray diffraction.** Morlevat, J.P.; Uny, G.; Jacquet-Francillon, N. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

The silic-borate base glass SON-58-30-24U2 contains 22 weight percent of fission products oxides. A methodology to measure by different methods the corresponding volume fractions is set up. The samples were heated at 760°C and different holding times.

23133 (Juel-Conf—42(Vol.2), pp 675-692) **Diopside glass-ceramic material for the immobilization of radioactive wastes.** Ninomiya, M.; Yamanaka, T.; Sakane, T.; Hora, M.; Nakamura, S.; Kawamura, S. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

This study concerns with glass-ceramics in Diopside system in which main crystalline phase is Diopside (CaO x MgO x $2SiO_2$) and main components of the inert additives are SiO_2, Al_2O_3, CaO, MgO and Fe_2O_3. Simulated oxides of HLLW from the reprocessing plant of PNC Japan were incorporated. As this glass-ceramic is crystallized without the independent heat treatment step for crystallization, the simplification for manufacturing process is performed.

23134 (Juel-Conf—42(Vol.2), pp 693-706) **Ceramic nuclear waste forms.** Jantzen, C.M.; Flintoff, J.; Morgan, P.E.D.; Harker, A.B.; Clarke, D.R. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

Minimization of additives enables high waste loading whereas excess additives produce inert phases which provide microstructural isolation of the radiophases. Simple tailoring and processing can be used to accommodate all the radio-nuclides in most commercial and defense wastes into fully dense strong ceramics. Tailoring formulation can be readily understood in terms of the crystal chemistry and the interactions that occur between the crystallochemical groupings when processing consideration such as control of oxidation-reduction and the effects of processing temperature and pressure are considered.

23135 (Juel-Conf—42(Vol.2), pp 707-712) **Review of multibarrier waste form development.** Rusin, J.M. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

The application of coatings and matrices as part of a multibarrier concept for the immobilization of nuclear wastes has been demonstrated by several investigators. The multibarrier concept provides an enhanced waste form by improvements in mechanical strength, leach resistance, and thermal stability. Process complexity is increased in the multibarrier process due to additional processing

steps, high-coating temperatures, molten metal transfer, and flammable coating gas mixtures.

23136 (Juel-Conf—42(Vol.2), pp 713-732) **Thermal analysis, thermogravimetry and crystal chemical characterization of phases.** Pentinghaus, H. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

Synthetic rocks of different compositions have been prepared through melting in order to evaluate the technological potential of this process (in contrast with the favoured hot-pressing technique working well below solidus temperatures). Thermal analyses guiding the cooling process and the optimization of the texture of synthetic rocks have been performed as well as thermal gravimetry has been applied to control mass losses due to incongruent evaporation. The crystalline phases formed have been characterized crystal-chemically by means of X-ray diffraction. So far all synthetic rocks prepared through melting contain smaller amounts of glass.

23137 (Juel-Conf—42(Vol.2), pp 767-782) **Concepts for the ultimate storage in geological formations.** Roethemeyer, H. Jun 1981. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

The protection aims for the ultimate storage have been presented quantitatively and qualitatively by national laws and regulations. The preliminary fundamentals layout data of ultimate storage mines for West-European countries and USA/Kanada are compared. The preliminary thermal layout data for ultimate storages in various host rocks concerning the USA are recorded.

23138 (Juel-Conf—42(Vol.2), pp 785-791) **Backfill barriers for nuclear waste repositories in salt.** Nowak, E.J. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

Backfill mixtures surrounding the waste form and canister can provide a neutral or slightly acidic, potentially reducing environment, prevent convective aqueous flow, and act as an effective radionuclide migration barrier. Bentonite is likely to remain hydrothermally stable but potentially sensitive to waste package interactions which could alter the pH, the ratio of dissolved wires, or the sorption properties of radionuclide species.

23139 (Juel-Conf—42(Vol.2), pp 792-815) **Requirements for the disposal of high-level radioactive wastes.** Warnecke, E.; Illi, H.; Ehrlich, D. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

In the FRG it is planned to dispose HLW in the salt dome in Gorleben. As the requirements for the disposal are dependent on the geological situation, it is necessary to have a realistic data base for the formulation of final requirements with a safety analysis. Airborne and water-borne radionuclide releases, thermal aspects, and quality control are some requirements which must be considered.

23140 (Juel-Conf—42(Vol.2), pp 816-828) **Composition of rocks - criteria for the conditioning of high-level radioactive wastes.** Herrmann, A.G. Jun 1981. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

Any discussion of safe burial of radwaste in rocks returns to the question of likely geochemical, mineralogical, and geological developments in the rock during the next 10^3 to 10^6 years. A scientifically well founded answer to this question will take account of the processes that combine to produce and to alter rocks and will offer more than a recital of stratigraphic data on the rock sequence. Every effort should be made to limit deformations and mineral reactions of the rocks to a possible minimum. The intervals for reprocessing waste and/or fuel elements and the fission-product concentration in the radwaste canisters must be controlled by the limits for deformations and mineral reactions of the rocks.

23141 (Juel-Conf—42(Vol.2), pp 829-843) **Interaction of vitrified high level waste with clay environment.** Iseghem, P. van; Timmermans, W.; Batist, R. de. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

Preliminary results of corrosion experiments at different temperatures in different media with a number of simulated borosilicates waste glasses suggest marked differences in corrosion resistance between the different glasses. Higher corrosion stability is found in glasses with smaller B_2O_3 content. These differences in corrosion stability between the different glasses, which are most pronounced in contact with distilled water, persist at the different temperatures. This results in considerable weight losses, and mechanical disruption of the glasses with the higher B_2O_3 content after a one week's exposure at 250°C. In both distilled water and clay-water the initial corrosion rate increases by a factor of 2 to 5 between 95 and 150°C, and by a factor of 10 to 100 between 150 and 250°C. Clay-water is found to corrode the glasses up to five times faster than distilled water. In general, however, corrosion rates are found to saturate after relatively short periods.

23142 (Juel-Conf—42(Vol.2), pp 844-872) **Effects of the product properties upon the ultimate storage medium salt and resulting conditions.** Gies, H.; Rothfuchs, T. Jun 1981. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

During the storage of HAW in the Na2, e.g. the Stassfurt-mineral salt of the Zechstein, the thermal release of water is of importance only if the hanging parts of the Na2 were heated up with polykalite and kieserite up to the releasing temperatures beginning at about 200°C. The mechanical effects in the ultimate storage area lead to higher creep rates. The release of radionuclides as a result of container corrosion can thus be limited.

23143 (Juel-Conf—42(Vol.2), pp 873-890) **Evaluation of the barriers in an ultimate storage for radioactive waste.** Memmert, G. Jun 1981. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

By means of a postulated intrusion of water in the mine building the reliability of individual and all barriers together is estimated. The shielding by the overlying rock seems to be extremely good for all short-life isotopes. The future works on the barrier system in the ultimate storage should therefore more concentrate on the increase of the barrier effect for the long-life isotopes. Especially the chemical processes between the compounds of the long-life isotopes dissolved in the groundwater or alkaline solutions and the substances for filling of routes and pits have to be studied.

23144 (Juel-Conf—42(Vol.2), pp 891-916) **Canister materials proposed for final disposal of high level nuclear waste.** Mattson, E. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

The nuclear waste will be enclosed in corrosion resistant canisters. These will be deposited in repositories in geological formations, such as granite, basalt, clay, bedded or domed salt, or the sediments beneath the deep ocean floor. There the canisters will be

exposed to groundwater, brine or seawater at an elevated temperature. Species formed by radiolysis may effect the corrosivity of the agent. The corrosion resistance of candidate canister materials is evaluated by corrosion tests and by thermodynamic and mass transport calculations. Examinations of ancient metal objects after long exposure in nature may give additional information. On the basis of the work carried out so far, the principal candidate canister materials are titanium materials, copper, and highpurity alumina.

23145 (Juel-Conf—42(Vol.2), pp 944-977) **Corrosion of materials in a clay environment.** Casteels, F.; Tas, H.; Heremans, R.; Brabers, M. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

Corrosion tests have been carried out at 25°C, 50°C, 100°C, 150°C, 200°C and 300°C on the following materials: carbon and chromized steel, different grades of austenitic and ferritic stainless steels, nickel and super alloys, aluminium and its alloys, copper and copper alloys, Ti and its alloys. The alloys were tested in the annealed and heat-treated condition (determined by the conditioning process). Welded and stressed specimens were also inserted in the tests. The metallographic techniques have been used for the determination of the extent of localized attack. The selection of the most promising candidate canister materials has been based on their resistance to the localized forms of attack and stress corrosion cracking susceptibility in the different possible environments. Ti and its alloys, Hastelloy C, UHB 904L and Inconel 625 possesses the highest corrosion resistance.

23146 (Juel-Conf—42(Vol.2), pp 978-1002) **Actinide sorption on rock minerals.** Allard, B.; Andersson, K.; Rydberg, J. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

The distribution coefficient (Ksub(d))-values show little temperature and particle size dependence, but increase with time. The Ksub(d)-values for actinides highly depend on groundwater pH and redox conditions. All actinide are in the tri- and tetravalent oxidation state in typical Swedish deep bedrock groundwater. Ion exchange on clay, adsorption on quartz, chemisorption on apatite and precipitation of hydroxides can be identified.

23147 (LA—9427-Vol.1) **Los Alamos Controlled Air Incinerator for radioactive waste. Volume I. Rationale, process, equipment, performance, and recommendations.** Neuls, A.S.; Draper, W.E.; Koenig, R.A.; Newmyer, J.M.; Warner, C.L. (Los Alamos National Lab., NM (USA)). Aug 1982. Contract W-7405-ENG-36. 43p. NTIS, PC A03/MF A01. Order Number DE83008739.

This two-volume report is a detailed design and operating documentation of the Los Alamos National Laboratory Controlled Air Incinerator (CAI) and is an aid to technology transfer to other Department of Energy contractor sites and the commercial sector. Volume I describes the CAI process, equipment, and performance, and it recommends modifications based on Los Alamos experience. It provides the necessary information for conceptual design and feasibility studies. Volume II provides descriptive engineering information such as drawing, specifications, calculations, and costs. It aids duplication of the process at other facilities.

23148 (LBL—15052) **Recent radiochemistry observations at the Riverton and Maybell tailings piles.** Smith, A.R.; Moed, B.A. (Lawrence Berkeley Lab., CA (USA)). Sep 1982. Contract AC03-76SF00098. 21p. (CONF-821209—8). NTIS, PC A02/MF A01. Order Number DE83008398.

From 5. annual symposium on uranium mill tailings management; Ft. Collins, CO, USA (9 Dec 1982).

Portions are illegible in microfiche products.

Preliminary results are presented from the radiochemistry effort of the Lawrence Berkeley Laboratory integrated study of the inactive uranium mill tailings sites at Riverton, Wyoming and Maybell, Colorado. These results were obtained primarily by use of γ-ray spectrometric techniques, and included both field and laboratory application of NaI(Tl) crystal and Ge-semiconductor detector systems. Current interpretation of this evidence indicated there has been downward migration of uranium within the tailings column since its emplacement, and upward movement of several radionuclides from the tailings into the overlying cover material. The mechanisms responsible for these migrations are believed to involve fluid transport, and are further believed to be active at the present time.

23149 (NUREG/BR—0025-Vol.9-No.2) **Information report on state legislation.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of State Programs). 1 Mar 1983. 13p. NTIS, PC A02/MF A01 - GPO. Order Number DE83901515.

Radioactive Waste Management legislation (enacted and introduced) in various states is summarized.

23150 (NUREG/CR—2854-813-1164D) **Evaluation of alternative shaft-sinking techniques for high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 3), June 1981-July 1982.** Gonano, L.; Findley, D.; Wildanger, W.; Gates, R.; Phillips, S. (Golder Associates, Inc., Bellevue, WA (USA)). Mar 1983. 187p. NTIS, PC A09/MF A01 - GPO $7.00. Order Number DE83901896.

Portions are illegible in microfiche products.

This report represents the results of Task 3 of US Nuclear Regulatory Commission (NRC) Contract, Technical Assistance for Repository Design. The purpose of the complete project is to provide NRC with technical assistance for the following reasons: To enable the focused, adequate review by NRC of aspects related to design and construction of an in situ test facility and final geologic repository, as presented in US Department of Energy (DOE) Site Characterization Reports (SRC), To ascertain that the DOE site characterization program will provide, as far as possible, all the information necessary to permit a review to be conducted by NRC of a license application for construction authorization. It is assumed that the Site Characterization Report and License Application will describe the exploratory shaft and concept designs for the repository shafts. This report provides a comparative evaluation of various shaft sinking techniques for production shafts for a repository. The primary comparative evaluation has been conducted for 14-ft internal diameter shafts developed in two composite media using four different methods of sinking/lining. The technical, cost and schedule comparisons draw a major distinction between shafts sunk blind and those which utilize bottom access. Based on the system of ranking introduced to grade the significant attributes of each method and the resulting design, it is concluded that for application to repository access, no one particular method of sinking exhibits a clear overall superiority. When a specific site is made available for a study of the most suitable shaft sinking methods, it will be necessary to establish actual geological conditions and technological capabilities and the comparisons presented herein reviewed accordingly.

23151 (NUREG/CR—2959-813-1165) **Relationship of an in-situ test facility to a deep geologic repository for high-level nuclear waste. Final report (Task 4), June 1981-October 1982.** Gates, R.; Bauhof, F.; Gonano, L. (Golder Associates, Inc., Bellevue, WA (USA)). Mar 1983. 57p. NTIS, PC A04/MF A01 - GPO $5.00. Order Number DE83901818.

Portions are illegible in microfiche products.

An in-situ test facility has been proposed for site characterization and design data collection for high-level nuclear waste deep geologic repositories. This report evaluates and presents recommendations on the relationship between an in-situ test facility (exploratory shaft and underground test facility) and the repository. Technical and construction issues are addressed in generic terms for an in-situ test facility which forms an integral part of the repository. Facility requirements defined and justified include location and size of the test facility, the design, construction and operational features of the exploratory shaft and underground test facilities, and the nature and duration of in situ testing. Media/site specific considerations are also presented. It is recommended that the exploratory shaft allow for adequate characterization of the strata surrounding the repository horizon. The underground test facility must be of a size and at a location which allow direct and explicit full-scale sampling

of the engineering behavior of the materials of the repository site. Construction of the exploratory shaft and test facility should utilize the same methods as planned for the proposed corresponding repository structures.

23152 **(NUREG/CR—3030) Evaluation of selected neutralizing agents for the treatment of uranium tailings leachates. Laboratory progress report.** Sherwood, D.R.; Serne, R.J. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 36p. (PNL—4524). NTIS, PC A03/MF A01 - GPO $4.50. Order Number DE83009375.

Portions are illegible in microfiche products.

Laboratory experiments were conducted to evaluate the performance of selected neutralizing agents for the treatment of uranium tailings solutions. Highly acidic tailings solutions (pH<2) from the Lucky Mc Mill in Gas Hills, Wyoming and the Exxon Highlands Mill near Casper, Wyoming were neutralized to a pH of 7 or greater using seven neutralizing agents. Reagents used included: Fly Ash from Boardman Coal Plant, Boardman, Oregon; Fly Ash from Wyodak Coal Plant, Gillette, Wyoming; Calcium carbonate ($CaCO_3$) reagent grade; Calcium hydroxide [$Ca(OH)_2$] reagent grade; Magnesium oxide (MgO) reagent grade; Sodium carbonate (Na_2CO_3) reagent grade; and Sodium hydroxide (NaOH) reagent grade. Evaluation of the effectiveness for the treatment of uranium tailings solutions for the selected neutralizing agents under controlled laboratory conditions was based on three criteria. The criteria are: (1) treated effluent water quality, (2) neutralized sludge handling and hydraulic properties, and (3) reagent costs and acid neutralizing efficiency. On the basis of these limited laboratory results calcium hydroxide or its dehydrated form CaO (lime) appears to be the most effective option for treatment of uranium tailings solutions.

23153 **(NUREG/CR—3065-813-1163-Vol.1) In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 2), June 1981-November 1982.** Roberds, W.; Bauhof, F.; Gonano, L. (Golder Associates, Inc., Bellevue, WA (USA)). Mar 1983. 220p. NTIS, PC A10/MF A01 - GPO $7.50. Order Number DE83901897.

Portions are illegible in microfiche products.

The media and sites considered include (1) basalt at Hanford, Washington; (2) tuff at Yucca Mountain, Nevada Test Site; (3) domal salt at specific Gulf Coast sites; (4) bedded salt at an unspecified site; and (5) granite at an unspecified site. A licensing perspective is outlined and a defensible rationale developed and utilized for the test selection process. This rationale essentially consists of: establishing the information needs for construction authorization; assessing the relevant capabilities of available tests; and matching the capabilities of specific tests to the perceived information needs. The information needs at any time consist of the additional information (if any) needed in order to predict satisfactory repository system performance with the required level of confidence, and thus are a function of: the significance of the repository engineered components and site characteristics to system performance; the currently available information, which may be supplemented with time; and the acceptable level of confidence in satisfactory performance for each licensing step. Determination of the acceptable levels of confidence and the significance of repository system components is outside the scope of this report. Suitable assumptions have thus been made regarding the development of information needs for construction authorization by the time of initial site submittals. Tests which are available and respond to the perceived media/site specific information needs, either by simulation or assessment of site characteristics, are identified and their capabilities assessed. Specific in situ tests are investigated and described in detail. Research and development which might be effective in improving test capabilities have been recommended.

23154 **(NUREG/CR—3065-813-1163-Vol.2) In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Appendices. Final report (Task 2), June 1981-November 1982.** Roberds, W.; Bauhof, F.; Gonano, L. (Golder Associates, Inc., Bellevue, WA (USA)). Mar 1983. 694p. NTIS, PC A99/MF A01 - GPO $13.00. Order Number DE83901895.

Portions are illegible in microfiche products.

The media and sites considered include: (1) basalt at Hanford, Washington; (2) tuff at Yucca Mountain, Nevada Test Site; (3) domal salt at specific Gulf Coast sites; (4) bedded salt at an unspecified site; and (5) granite at an unspecified site. A licensing perspective is outlined and a defensible rationale developed and utilized for the test selection process. This rationale essentially consists of: establishing the information needs for construction authorization; assessing the relevant capabilities of available tests; and matching the capabilities of specific tests to the perceived information needs. The information needs at any time consist of the additional information (if any) needed in order to predict satisfactory repository system performance with the required level of confidence, and thus are a function of: the significance of the repository engineered components and site characteristics to system performance; the currently available information, which may be supplemented with time; and the acceptable level of confidence in satisfactory performance for each licensing step. Determination of the acceptable levels of confidence and the significance of repository system components is outside the scope of this report. Suitable assumptions have thus been made regarding the development of information needs for construction authorization by the time of initial site characterization reports submittals. Tests which are available and respond to the perceived media/site specific information needs, either by simulation or assessment of site characteristics, are identified and their capabilities assessed. Specific in situ tests are investigated and described in detail. Research and development which might be effective in improving tests capabilities have been recommended.

23155 **(NUREG/CR—3144) Trench design and construction techniques for low-level radioactive waste disposal.** Tucker, P.G. (Army Engineer Waterways Experiment Station, Vicksburg, MS (USA). Geotechnical Lab.). Feb 1983. 221p. NTIS, PC A10/MF A01 - GPO $8.00. Order Number DE83901403.

Portions are illegible in microfiche products.

This document provides information on trench design and construction techniques which can be used in the disposal of LLW by shallow land burial. It covers practices currently in use not only in the LLW disposal field, but also methods and materials being used in areas of hazardous and municipal waste disposal which are compatible with the performance objectives of 10 CFR Part 61. The complexity of a disposal site and its potential problems dictate the use of site-specific characteristics when designing a LLW disposal trench. This report presents the LLW disposal trench as consisting of various elements or unit processes. The term unit processes is used as it more fully relays the impact of the designer's choice of methods and materials. When choosing a material to fulfill the function of a certain trench element, the designer is also stipulating a portion of his operational procedure which must be compatible with the disposal operation as a whole. Information is provided on the properties, selection, and installation of various materials such as bentonite, soil-cement, polymeric materials, asphaltic materials, and geotechnical fabrics. This is not intended to outline step-by-step procedures. Basically, three time frames are addressed with respect to construction techniques; preoperational, operational, and postoperational. Within each of these time frames there are certain construction techniques which can be employed by the designer to enhance the overall ease of construction and ultimate success of the disposal facility. Among the techniques presented are precontouring the disposal area, alignment of the trench axis, sloping the trench bottom, incremental excavation, and surface water (runoff) management.

23156 **(ONWI—9(82-2)) Technical progress report for the quarter 1 January-31 March 1982.** (Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation). 1982. Contract AC06-76RL01830. 197p. NTIS, PC A09/MF A01. Order Number DE83008477.

This report describes the technical accomplishments on the commercial nuclear waste management programs under the direction of the Office of Nuclear Waste Isolation (ONWI). The scope of ONWI activities includes providing the technology and facilities for the terminal isolation of nuclear wastes by disposal in mined repositories deep underground in stable geologic formations. The ONWI program is organized into the following eight tasks: (1) sys-

tems; (2) waste package; (3) site; (4) repository; (5) regulatory and institutional; (6) test facilities and excavations; (7) land acquisition; and (8) program management. Progress reports and summaries are presented for the first 6 tasks.

23157 **(PB—83-139394) Disposal of low-level radioactive biomedical wastes (an Academy Forum held November 24, 1980).** (National Academy of Sciences - National Research Council, Washington, DC (USA)). 24 Nov 1980. 78p. NTIS, PC A05/MF A01.

The Academy Forum which is reported here focuses on the disposal of low-level radioactive biomedical wastes. Radioactive isotopes are so useful in biological and medical research and in some kinds of medical treatment that their use has been expanding and now is very large. The disposal of these wastes is a problem because of uncertainty about the continued availability of these sites. There is a concern about the fact that research and medical treatment may be jeopardized by future developments concerning these sites. Other possible means of disposing these low-level wastes are discussed.

23158 **(PNL—3000-8) Nuclear waste management. Quarterly progress report, October through December 1980.** Chikalla, T.D.; Powell, J.A. (comps.). (Pacific Northwest Lab., Richland, WA (USA)). Mar 1981. Contract AC06-76RL01830. 132p. NTIS, PC A07/MF A01. Order Number DE83009153.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Progress reports and summaries are presented under the following headings: high-level waste process development; alternative waste forms; nuclear waste materials characterization center; TRU waste immobilization; TRU waste decontamination; krypton solidification; thermal outgassing; iodine-129 fixation; monitoring and physical characterization of unsaturated zone transport; well-logging instrumentation development; mobility of organic complexes of radionuclides in soils; waste management system studies; waste management safety studies; assessment of effectiveness of geologic isolation systems; waste/rock interactions technology; high level waste form preparation; development of backfill material; development of structural engineered barriers; ONWI disposal charge analysis; spent fuel and fuel component integrity program; analysis of spent fuel policy implementation; analysis of postulated criticality events in a storage array of spent LWR fuel; asphalt emulsion sealing of uranium tailings; liner evaluation for uranium mill tailings; multilayer barriers for sealing of uranium tailings; application of long-term chemical biobarriers for uranium tailings; revegetation of inactive uranium tailing sites; verification instrument development.

23159 **(PNL—3172) High-temperature leaching of an actinide-bearing, simulated high-level waste glass.** Westsik, J.H. Jr.; Harvey, C.O.; Kuhn, W.L. (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 59p. NTIS, PC A04/MF A01. Order Number DE83008755.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The chemical durability of a simulated high-level waste glass when exposed to high-temperature geologic solutions was investigated. In this study, simulated high-level waste glass-beads (76 to 68 glass)I doped with technetium, uranium, neptunium, plutonium, curium and americium were leached in deionized water, Waste Isolation Pilot Plant salt brine B, and 0.03M sodium bicarbonate solution at 150 and 250°C for 2, 4, 8, 16, and 32 days. The resulting solutions were analyzed for several nonradioactive glass components and for the radioactive dopants. The glass exhibited incongruent leaching behavior, i.e., the normalized releases (g-glass/m^2) based on the different elements spanned four orders of magnitude. Normalized releases based on boron, molybdenum, sodium, cesium, silicon, and technetium were the same within a factor of three. Most of the nonradioactive components of the glass were released more to the salt brine than to the other two solutions. However, silicon, boron, molybdenum, technetium, and the actinides had their lowest releases in the salt brine. Reaction-layer thickness on the glass surface and weight losses of the glass beads were also smallest in the brine solution. Actinide releases were highest in the sodium bicarbonate solution. Calcium, strontium and barium releases decreased with time and temperature; the releases of most other elements increased with time and temperature. Solubility appears to be limiting the release of most elements. The leachate pH is controlled by chemical species within the original leachant and by species released as the glass leached. Carbonate ion complexes with some elements including uranium, effectively increasing their release. The more soluble elements including sodium, boron, molybdenum and technetium provide an indication of the actual rate of reaction between the glass and water.

23160 **(PNL—4423) Design and performance of feed-delivery systems for simulated radioactive waste slurries.** Perez, J.M. Jr. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 72p. NTIS, PC A04/MF A01. Order Number DE83008721.

Processes for vitrifying simulated high-level radioactive waste have been developed at the Pacific Northwest Laboratory (PNL) over the last several years. Paralleling this effort, several feed systems used to deliver the simulated waste slurry to the melter have been tested. Because there had been little industrial experience in delivering abrasive slurries at feed rates of less than 10 L/min, early experience helped direct the design of more-dependable systems. Also, as feed delivery requirements changed, the feed system was modified to meet these new requirements. The various feed systems discussed in this document are part of this evolutionary process, so they have not been ranked against each other. The four slurry feed systems discussed are: (1) vertical-cantilevered centrifugal pump system; (2) airlift feed systems; (3) pressurized-loop systems; and (4) positive-displacement pump system. 20 figures, 11 tables.

23161 **(PNL—4436) Decision-tree approach to evaluating inactive uranium-processing sites for liner requirements.** Relyea, J.F. (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 66p. NTIS, PC A04/MF A01. Order Number DE83009348.

Recently, concern has been expressed about potential toxic effects of both radon emission and release of toxic elements in leachate from inactive uranium mill tailings piles. Remedial action may be required to meet disposal standards set by the states and the US Environmental Protection Agency (EPA). In some cases, a possible disposal option is the exhumation and reburial (either on site or at a new location) of tailings and reliance on engineered barriers to satisfy the objectives established for remedial actions. Liners under disposal pits are the major engineered barrier for preventing contaminant release to ground and surface water. The purpose of this report is to provide a logical sequence of action, in the form of a decision tree, which could be followed to show whether a selected tailings disposal design meets the objectives for subsurface contaminant release without a liner. This information can be used to determine the need and type of liner for sites exhibiting a potential groundwater problem. The decision tree is based on the capability of hydrologic and mass transport models to predict the movement of water and contaminants with time. The types of modeling capabilities and data needed for those models are described, and the steps required to predict water and contaminant movement are discussed. A demonstration of the decision tree procedure is given to aid the reader in evaluating the need for the adequacy of a liner.

23162 **(PNL—4625) MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates.** Smith, R.I.; Nesbitt, J.F. (Pacific Northwest Lab., Richland, WA (USA)). Nov 1982. Contract AC06-76RL01830. 257p. NTIS, PC A12/MF A01. Order Number DE83008719.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A program is described to examine the various alternatives for monitored retrievable storage (MRS) and interim storage (IS) of spent nuclear fuel, solidified high-level waste (HLW), and transuranic (TRU) waste until appropriate geologic repository/repositories are available. The objectives of this study are: (1) to develop a preconceptual design for an MRS/IS facility that would become the principal surface facility for a deep geologic repository when the repository is opened, (2) to examine various issues such as transportation of wastes, licensing of the facility, and environmental concerns associated with operation of such a facility, and (3) to esti-

mate the life cycle costs of the facility when operated in response to a set of scenarios which define the quantities and types of waste requiring storage in specific time periods, which generally span the years from 1990 until 2016. The life cycle costs estimated in this study include: the capital expenditures for structures, casks and/or drywells, storage areas and pads, and transfer equipment; the cost of staff labor, supplies, and services; and the incremental cost of transporting the waste materials from the site of origin to the MRS/IS facility. Three scenarios are examined to develop estimates of life cycle costs of the MRS/IS facility. In the first scenario, HLW canisters are stored, starting in 1990, until the co-located repository is opened in the year 1998. Additional reprocessing plants and repositories are placed in service at various intervals. In the second scenario, spent fuel is stored, starting in 1990, because the reprocessing plants are delayed in starting operations by 10 years, but no HLW is stored because the repositories open on schedule. In the third scenario, HLW is stored, starting in 1990, because the repositories are delayed 10 years, but the reprocessing plants open on schedule.

23163 **(PNL—4637) International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report.** Lakey, L.T.; Harmon, K.M. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 78p. NTIS, PC A05/MF A01. Order Number DE83008556.

In FY 1982, DOE and DOE contractor personnel attended 40 international symposia and conferences on fuel reprocessing and waste management subjects. The treatment of high-level waste was the topic most often covered in the visits, with geologic disposal and general waste management also being covered in numerous visits. Topics discussed less frequently inlcude TRU/LLW treatment, airborne waste treatment, D and D, spent fuel handling, and transportation. The benefits accuring to the US from technology exchange activities with other countries are both tangible, e.g., design of equipment, and intangible, e.g., improved foreign relations. New concepts initiated in other countries, particularly those with sizable nuclear programs, are beginning to appear in US efforts in growing numbers. The spent fuel dry storage concept originating in the FRG is being considered at numerous sites. Similarly, the German handling and draining concepts for the joule-heated ceramic melter used to vitrify wastes are being incorporated in US designs. Other foreigh technologies applicable in the US include the slagging incinerator (Belgium), the SYNROC waste form (Australia), the decontamination experience gained in decommissioning the Eurochemic reprocessing plant (Belgium), the engineered surface storage of low- and intermediate-level waste (Belgium, FRG, France), the air-cooled storage of vitrified high-level waste (France, UK), waste packaging (Canada, FRG, Sweden), disposal in salt (FRG), disposal in granite (Canada, Sweden), and sea dumping (UK, Belgium, The Netherlands, Switzerland). These technologies did not necessarily originated or have been tried in the US but for various reasons are now being applied and extended in other countries. This growing nuclear technological base in other countires reduces the number of technology avenues the US need follow to develop a solid nuclear power program.

23164 **(PNL-SA—9637) Performance of asphalt and clay liners as a uranium mill tailings leachate barrier.** Buelt, J.; Barnes, S. (Pacific Northwest Lab., Richland, WA (USA)). 1981. Contract AC06-76RL01830. 8p. NTIS, PC A02/MF A01. Order Number DE81029160.

Pacific Northwest Laboratory is evaluating the long-term effectiveness of various asphalt clay liner materials as a radionuclide and process chemical barrier from uranium mill tailings. A field test is being conducted by monitoring asphalt and clay liners installed at the Grand Junction, Colorado tailings site. In addition, eight prospective liners have undergone three months exposure to accelerated conditions to predict their behavior over a 1000-year period. High-calcium leachates have been forced through thin layers of clay to determine the ability of the clay to resist ion exchange, which reduces its swelling capabilities. Asphalt liners have been exposed to elevated temperatures and increased strengths of oxidizing agents to accelerate their aging process. The permeability coefficients measured during this exposure were then used to predict each liners stability with time. The analyses thus far show that clay soils with bentonite amendments and most asphalt compositions have good long-term performance characteristics.

23165 **(PNL-SA—9829) Iodine-fixation studies at the Pacific Northwest Laboratory.** Burger, L.L.; Scheele, R.D. (Pacific Northwest Lab., Richland, WA (USA)). Aug 1981. Contract AC06-76RL01830. 24p. (CONF-810971—1). NTIS, PC A02/MF A01. Order Number DE81030297.

From Specialists' meeting on radioiodine management; Brussels, Belgium (25 Sep 1981).

Portions are illegible in microfiche products.

The aim of the iodine program at PNL is to develop technologies that will provide safe and effective removal and packaging of ^{129}I for interim storage and shipping and for permanent isolation. Iodine recovery and fixation processes, and the evaluation of fixation compounds and materials are included in the program. Iodine-containing compounds have been evaluated on the basis of chemical and thermal stability, solubility, and cost and availability. Other materials examined were silver mordenite and faujasite, AC-6120, and a synthetic iodine-containing sodalite. Work on silver-containing absorbents includes study of the effects of operating parameters on the removal of organic iodides by reduced silver mordenite, on the recycle of silver mordenite, and on the general mechanisms of iodine fixation on metal zeolites. We have shown that normally only a small amount of the total silver capacity is utilized in forming stable silver-iodine compounds. The remainder of the iodine absorbed is held in a less stable complex and can be removed by heating. None of the forms examined, with the possible exception of silver-iodide-containing materials, have combined stability-leach rate characteristics compatible with time periods of more than a few thousand years. Criteria for storage or disposal need to be established before the results of the chemical and thermal evaluations can be applied. In this regard, some effort has recently been directed at the criteria question. 18 figures, 2 tables.

23166 **(PNL-SA—10777) Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository.** McKee, R.W. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 20p. (CONF-830205—15). NTIS, PC A02/MF A01. Order Number DE83008238.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

Results are described for a study to assess the benefits and costs of fractionating the cesium and strontium components in commercial high-level waste (HLW) to a separate waste stream for the purpose of reducing geologic repository thermal stresses. System costs are developed for a broad range of conditions comparing the Cs/Sr fractionation concept with disposal of 10-year old vitrified HLW and vitrified HLW aged to achieve (through decay) the same heat output as the fractionated high-level waste (FHLW). All comparisons are based on a 50,000 metric ton equivalent (MTE) system. The FHLW and the Cs/Sr waste are both disposed of a vitrified waste but emplaced in separate areas of a basalt repository. The FHLW is emplaced in high-integrity packages at relatively high waste loading but low heat loading, while the Cs/Sr waste is emplaced in minimum integrity packages at relatively high heat loading. System cost comparisons are based on minimum cost combinations of canister diameter, waste concentration, and canister spacing in a basalt repository for each waste type. The effects on both long- and near-term safety considerations are also addressed. The major conclusion is that the Cs/Sr fractionation concept offers, potentially, a substantial total system cost advantage for HLW disposal if reduced HLW package temperatures in a basalt repository are desired. However, there is no cost advantage if currently designated maximum design temperatures are acceptable. Aging the HLW for 50 to 100 years can accomplish similar results at equivalent or loser costs.

23167 **(PNL-SA—10780) Field and laboratory evaluation of the mobility of cobalt-60/EDTA in an arid environment.** Jones, T.L.; Gee, G.W.; Swanson, J.L.; Kirkham, R.R. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 9p. (CONF-830205—13). NTIS, PC A02/MF A01. Order Number DE83007391.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

Portions are illegible in microfiche products.

The ability of the organic complexant EDTA to enhance the mobility of cobalt-60 was investigated in both laboratory and field experiments. Laboratory tests consisted of short term (approximately 7 day) column and batch adsorption tests using soil from the Hanford site as well as long term (approximately 70 day) batch tests with Hanford soil and soils from Oak Ridge and Savannah River. In addition, two large scale tracer tests were conducted using Hanford soil. One used a large (1.6 m) laboratory column, spiked with cobalt-60/EDTA and the other was a field test conducted in an 8 m deep lysimeter. Enhanced mobility decreased sorption were observed in both column and batch tests when the cobalt-60/EDTA solutions contacted Hanford and Oak Ridge soil for only a few days. When long contact times were allowed (months) the Hanford soil showed large increases in sorption with time. The low sorption exhibited initially by the Oak Ridge soil increased slightly over time, however, the high sorption observed with the Savannah River soil remained constant with time. The reduced mobility, with time, observed in Hanford soils was confirmed in both the large scale laboratory and breaking down when contacted with Hanford and Savannah River soil and to a lesser extent, the Oak Ridge soil. It is not known at this time why the complex is breaking down or why the kinetics are different among the soils tested. The implication to waste management is that the potential for transport of cobalt by EDTA complexation may not be as serious as once thought.

23168 (PNL-SA—10800) Actinide-solubility controls in performance assessment of nuclear-waste repositories. Rai, D.; Strickert, R.G.; Swanson, J.L. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 6p. (CONF-830205—17). NTIS, PC A02/MF A01. Order Number DE83007859.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

The importance of solubility control of radionuclide concentrations in repository groundwaters is discussed. Such control allows readily defensible estimation of the maximum concentrations of some actinide radionuclides in groundwaters. Estimates from currently available data indicate a number of cases where such maximum concentrations will be near or below the concentrations that are permissible, without the benefit of other processes that will lower the concentrations even more. Available information is briefly summarized and further research needs, which are not overly extensive, are discussed. 6 figures.

23169 (PNL-SA—10829) Using process instrumentation to obviate destructive examination of canisters of HLW glass. Kuhn, W.L.; Slate, S.C. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 7p. (CONF-830205—20). NTIS, PC A02/MF A01. Order Number DE83007876.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

An important concern of a manufacturer of packages of solidified high-level waste (HLW) is quality assurance of the waste form. The vitrification of HLW as a borosilicate glass is considered, and, based on a reference vitrification process, it is proposed that information from process instrumentation may be used to assure quality without the need for additional information obtained by destructive examining (core drilling) canisters of glass. This follows mainly because models of product performance and process behavior must be previously established in order to confidently select the desired glass formulation, and to have confidence that the process is well enough developed to be installed and operated in a nuclear facility.

23170 (PNL-SA—10832) Potential for beneficial use of krypton-85. Tingey, G.L.; Jensen, G.A.; McClanahan, E.D.; Lytle, J.M.; Rising, K.R. (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 5p. (CONF-830205—19). NTIS, PC A02/MF A01. Order Number DE83007836.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

Large quantities of krypton-85 (about 42 MCi) are contained in stored power-reactor fuels and about 1 MCi/year in fuels processed at each of the Savannah River and Hanford defense fuel-processing plants. This nuclear byproduct could be a significant material resource if used in specialized applications. Recently a technique for implanting krypton in a growing sputter-deposited metallic film has been developed. This yields a stable, high-concentration source of krypton-85 which may have applications for small power generators. Metal deposits containing up to 14 at. % have been prepared that would give a heat source of 0.9 W/cm^3 if fully enriched krypton-85 were implanted. Potential applications for up to 10-W batteries include power for runway lighting and other specialized military applications in remote locations, power for telephone or radiocommunications in the far North, and power for monitoring equipment for tracking animals. Krypton-85 has the advantage of being environmentally the most acceptable heat-producing radioisotope available for power production. 1 figure.

23171 (PNL-SA—11144) Byproduct inventories. Wheelwright, E.J. (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 6p. (CONF-830205—16). NTIS, PC A02/MF A01. Order Number DE83007696.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

An inventory of potentially available nuclear byproducts from defense production activities and from the commercial fuel cycle has been prepared for inclusion in the DOE document, Department of Energy Plan for Recovery and Utilization of Nuclear Byproducts from Defense Wastes, which should be issued in 1983. The byproduct materials included in the inventory are strontium-90, cesium-137, krypton-85, xenon, palladium, rhodium, ruthenium, technetium-99, americium-241, promethium-147, neptunium-237, and curium. The inventory summarizes the amounts of these materials in current wastes and projects the quantities contained in future wastes. 2 figures, 7 tables.

23172 (PNL-SA—11174) Design surface covers: an approach to long-term waste site stabilization. Beedlow, P.A.; Cadwell, L.L.; McShane, M.C. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 8p. (CONF-830205—18). NTIS, PC A02/MF A01. Order Number DE83007837.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

The wide range of existing environmental conditions, potential contaminants and available cover materials at waste disposal sites necessitates site-specific designing of surface covers for effective long-term erosion resistance. This paper presents a systematic approach to designing surface covers for hazardous waste repositories that can be tailored to conditions at any site. The approach consists of three phases: (1) an assessment, during which the degree of required surface protection (erosion potential) is determined; (2) a preliminary design that integrates surface cover design with the need to minimize transport of contaminants; and (3) a final design, where the cost and effectiveness of the surface cover are determined. 1 figure.

23173 (PNL-SA—11179) Technology for recovery of byproducts. Van Tuyl, H.H. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 11p. (CONF-830205—14). NTIS, PC A02/MF A01. Order Number DE83008242.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

In this paper, a byproduct is considered to be any product from a nuclear fuel reprocessing plant other than the principal products of uranium and plutonium. Those which have been recovered on a large scale include: ^{237}Np, ^{90}Sr, ^{137}Cs, ^{85}Kr, ^{147}Pm, ^{241}Am, ^{244}Cm, and ^{144}Ce. Other byproducts which have been recovered in small amounts during development efforts are: Tc, Ru, Rh, Pd, and Xe. This paper reviews the byproducts of interest, compares and contrasts byproduct recovery with waste management, describes current and past byproduct recovery operations, development status of alternative processes, and bases for selection

among alternative processes in developing an integrated byproduct recovery plant. (ATT)

23174 **(RHO-BW-SA—219-P) Experimental investigation of sodium bentonite stability in Hanford basalt.** Wood, M.I. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). Feb 1983. Contract AC06-77RL01030. 10p. (CONF-821107—52). NTIS, PC A02/MF A01. Order Number DE83008328.

From 6. international symposium on the scientific basis for radioactive waste management; Boston, MA, USA (1 Nov 1982).

Sodium bentonite is a candidate material for the waste package backfill component in a repository in basalt at the Hanford Site. Preliminary hydrothermal experiments have been conducted under near-field geochemical conditions expected to occur in the reference repository location in Grande Ronde Basalt. Experiments have been conducted in the basalt/groundwater, bentonite/groundwater, and basalt/bentonite/groundwater systems. The experiments have been conducted at 300°C using a simulated Grande Ronde groundwater, reference Umtanum basalt, and sodium bentonite. Key data generated by the experiments include experimental solution analyses as a function of time and preliminary solids analysis by scanning transmission electron microscopy and x-ray diffraction. Solution trends of the major aqueous species were similar in the three systems and are characterized by: (1) the gradual reduction of the pH value from ~9.75 to a steady-state value of ~6, (2) an initial rapid increase followed by a gradual decreasein silica concentration, and (3) a slight or negligible increase in sodium, sulfate, and chloride concentrations. In the bentonite/groundwater experiment, small amounts (<1%) of an albite reaction product were observed. Conserversely, the formation of illite, a common bentonite alteration product, was not observed. These results indicate tjhat sodium bentonite will remain sufficiently stablee at 300°C under hydrothermal conditions in basalt to permit its use as a backfill material.

23175 **(RHO-BW-ST—46P) Summary of past Basalt Waste Isolation Project overviews during preliminary site characterization.** (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). Dec 1982. Contract AC06-77RL01030. 28p. NTIS, PC A03/MF A01. Order Number DE83008993.

The Basalt Waste Isolation Project, operated by Rockwell Hanford Operations for the US Department of Energy, is examining the feasibility and providing the technology to design and construct a geologic repository for storage of radioactive waste in basalt formations beneath the Hanford Site in south-central Washington State. Such a facility will be designed to meet the federal responsibility for custody and permanent isolation of commercial radioactive wastes in the United States. Beginning in 1976, the Basalt Waste Isolation Project External Affairs Program has included: technical overviews; formal interface between State of Washington officials and the Basalt Waste Isolation Project; active communications program to disseminate information as part of the Basalt Waste Isolation Project. This document is a summary of the technical reviews that have been conducted as part of the Basalt Waste Isolation Project External Affairs Program to date.

23176 **(UCRL—88167) Laser isotope separation in nuclear-waste by-product utilization.** Dubrin, J.W. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 7p. (CONF-830205—22). NTIS, PC A02/MF A01. Order Number DE83009243.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

Portions are illegible in microfiche products.

Various by-products in spent nuclear fuels including strategic metals are uniquely useful and of high intrinsic value. Isotope separation is necessary to achieve the full benefits of fission-product partitioning, increasing the specific activity of radioactive modifications or reducing the intrinsic radiation associated with various elements. The atomic-vapor laser-isotope-separation process, under large-scale development for uranium enrighment, applies to most of the spent-fuel nuclides and offers attractive benefit to costs. 11 figures.

23177 **Too hot to handle. Social and policy issues in the management of radioactive wastes.** Walker, C.A.; Gould, L.C.; Woodhouse, E.J. (eds.). New Haven, CT; Yale University Press (1983). 209p.

Information about the management of radioactive wastes is provided in this book. Specifically, the book attempts to supply information to further the understanding of the history of radioactive waste management in this country and the role of nuclear energy in the future of the US; the science and technology of the processes that produce radioactive wastes and of the methods proposed for managing them; the biological effects of radiation; the public attitudes about nuclear power; the nature of risks resulting from technological developments and ways of managing them; and the political institutions and processes that govern radioactive waste management. The authors have attempted to present an objective view of nuclear waste management taking a stand neither for nor against nuclear power but placing special emphasis on radioactive waste management rather than nuclear power, because they feel that the latter aspect of the subject has received much more extensive coverage elsewhere. The contents of the book are divided into 7 chapters entitled: The Radioactive Waste Management Problem, Science and Technology of the Sources and Management of Radioactive Wastes, Nuclear Waste Management and Risks to Human Health, Public Attitudes toward Radioactive Wastes, How Safe Is Safe Enough; Determinants of Perceived and Acceptable Risk, The Politics of Nuclear Waste Management, and Value Issues in Radioactive Waste Management. (BLM)

23178 **Application of systems analysis to the disposal of high level waste in deep ocean sediments.** De Marsily, G. (Ecole des Mines de Paris, Fontainbleau, France); Hill, M.D.; Mobbs, S.F.; Webb, G.A.M. (National Radiological Protection Board, Chilton, Didcot, UK); Murray, C.N. (Commission of the European Communities, Ispra (Italy). Joint Research Centre); Talbert, D.M. (Sandia National Labs., Albuquerque, NM (USA)); van Dorp, F. (NAGRA, Baden, Switzerland). *Radioactive Waste Management and the Nuclear Fuel Cycle;* 3: No. 2, 199-213(Dec 1982).

Emplacement in deep ocean sediments is one of the disposal options being considered for solidified high level radioactive waste. Task groups set up within the framework of the NEA Seabed Working Group have been studying many aspects of this option since 1976. The methods of systems analysis have been applied to enable the various parts of the problem to be assessed within an integrated framework. This paper describes the progress made by the Systems Analysis Task Group towards the development of an overall system model. The Task Group began by separating the problem into elements and defining the interfaces between these elements. A simple overall system model was then developed and used in both a preliminary assessment and a sensitivity analysis to identify the most important parameters. These preliminary analyses used a very simple model of the overall system and therefore the results cannot be used to draw any conclusions as to the acceptability of the sub-seabed disposal option. However they served to show the utility of the systems analysis method. The work of the other task groups will focus on the important parameters so that improved results can be fed back into an improved system model. Subsequent iterations will eventually provide an input to an acceptability decision.

23179 **On-line, real-time measurements of decontamination factors for a low-level waste incinerator.** Close, D.A.; Draper, W.E. (Los Alamos National Lab., NM (USA)). *Nuclear Instruments and Methods in Physics Research;* 201: No. 2/3, 451-456(15 Oct 1982).

A method is described to monitor the distribution of radioactive isotopes through the off-gas treatment system of an incinerator. Simulated commercial waste spiked with known amounts of five fission products, ^{131}I, ^{106}Ru, ^{137}Cs, ^{59}Fe, ^{60}Co, were incinerated. High resolution photon detectors were installed on the off-gas handling system of the controlled air incinerator at the Los Alamos National Laboratory to determine relative decontamination factors, which ranged from a low of 40 for ^{137}Cs to a high of 5000 for ^{131}I. Background measurements were made to determine the residual activity in the incinerator. Due to the constant purging of the

system to maintain a negative pressure with respect to the surrounding environment, the residual activity decays more rapidly than dictated by its half-life.

23180 **Waste sludge composition at the Savannah River Plant.** Fowler, J.R. (E. I. du Pont de Nemours & Company, Savannah River Laboratory, Aiken, SC 29808). *Transactions of the American Nuclear Society;* **41**: 159(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23181 **Leaching of polyphase nuclear waste ceramics: microstructural and phase characterization.** Jantzen, C.M.; Clarke, D.R.; Morgan, P.E.D.; Harker, A.B. (Rockwell Int Sci Cent, Thousand Oaks, CA, USA). *Journal of the American Ceramic Society;* **65**: No. 6, 292-300(Jun 1982).

Alumina-based ceramics are potential materials for storage of nuclear wastes. Static leach tests conducted on ceramic monoliths in deionized water, in simulated silicate, and in brine groundwaters, conforming to Materials Characterization Center standards and an accelerated, microscopic leach test, were used to identify the processes. Dissolution and formation of surface passivation layers are discussed. 40 refs.

23182 **Why not in the ocean.** Osterberg, C.L. (Department of Energy, Washington, DC (USA). Office of Health and Environmental Research). *International Atomic Energy Agency Bulletin;* **24**: No. 2, 30-34(Jun 1982).

The advantages of marine disposal of radioactive wastes are briefly discussed in the article. The US experience in this area and some studies undertaken by the IAEA's Monaco Laboratory are also analysed.

0530 Environmental Aspects

REFER ALSO TO CITATION(S) 23102, 23119, 23148, 23152, 23168, 23178, 24484

23183 **(CONF-820911—4) Environmental monitoring considerations for low-level waste disposal sites.** Sedlet, J. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 20p. NTIS, PC A02/MF A01. Order Number DE83008534.

From Symposium on low level waste disposal; Washington, DC, USA (29 Sep 1982).

All waste disposal sites are required to monitor the environment. The proposed NRC licensing rule, 10 CFR Part 61, requires that such monitoring be conducted before, during, and after a site is operated. An adequate monitoring program consists of measuring concentrations of radionuclides, chemically-toxic substances, and leachate indicators in environmental media and of evaluating specific physical properties of the site. In addition, the composition of the buried waste must be known. Methods for obtaining this information are discussed and monitoring programs are presented for the preoperational, operational, and postclosure phases of a disposal site. Environmental monitoring is considered in a broad context, since it includes monitoring burial trenches onsite, as well as surveillance in the offsite environment. Postclosure monitoring programs will be strongly influenced by the operational monitoring results. In some respects, this phase will be easier since the migration pathways should be well known and the number of radionuclides of concern reduced by radioactive decay. The results of the environmental monitoring program will be vital to successful site operation. These results should be used to determine if operational changes are needed and to predict future environmental impacts.

23184 **(NUREG/CR—3130) Influence of leach rate and other parameters on groundwater migration.** Oztunali, O.I.; Pitt, C.J.; Furfaro, J.P. (Dames and Moore, White Plains, NY (USA)). Feb 1983. 328p. NTIS, PC A15/MF A01 - GPO $8.50. Order Number DE83901512.

Portions are illegible in microfiche products.

A sensitivity analysis is performed in which the leaching characteristics of selected low-level radioactive waste streams are varied, and the resulting potential human exposures due to groundwater migration calculated, as a function of alternative disposal site environmental characteristics and alternative disposal facility designs and operating practices. This analysis is also performed to assess whether a leaching standard for solidified waste streams is necessary to ensure safe disposal of low-level waste. The results of the analysis indicate that reducing the leaching potential of the waste streams suitable for solidification reduces calculated exposures due to groundwater migration. However, the relationship between the leaching potential of these solidified waste streams and the calculated exposures appears to be approximately asymptotic rather than linear. As the leaching potential of the waste streams suitable for solidification is reduced, a point is rapidly reached in which further reductions in the leaching potential have little effect on the calculated impacts. This is because only a limited volume (about 25%) of the total waste disposed is actually suitable for solidification, and even if the releases from the waste streams suitable for solidification were reduced to zero, there would still be the releases from all the waste streams which are not suitable for solidification. The analysis also indicates that measures which can be taken to reduce percolation into the disposal cells (e.g., waste stability, improved compaction) and to reduce contact of waste by water are comparatively less expensive and more effective in reducing groundwater migration exposures than large reductions in the leaching potentials of the waste streams suitable for solidification.

23185 **(PB—83-147892) Basic technique and models for determining exposure rates over uranium-bearing soils. Final report.** Oksza-Chocimowski, G.V. (Office of Radiation Programs, Las Vegas, NV (USA)). Aug 1982. 160p. NTIS, PC A08/MF A01.

The application of simple computer-implemented analytical procedures to predict exposure rates over uranium-bearing soil deposits is demonstrated in this report. The method is based, conceptually, on the energy-dependent point-source buildup factor and, operationally, on two consecutive integrations. The dependence of photon fluxes on spatial variables is simplified by an analytical integration over the physical dimensions of the deposit, represented as a slab bearing homogeneously distributed nuclides of the uranium-238 decay chain, at equilibrium, and covered with a source-free overburden slab; both slabs being of variable thickness but of infinite areal extent. The resultant analytical expression describes flux as function of energy-dependent parameters, thickness of the source slab, and depth of overburden, and is equated analytically to exposure rates bearing the same dependence. Elementary computer techniques are then employed to integrate numerically the exposure rates corresponding to the specific energies of uranium-238 decay chain, for chosen thicknesses of the overburden and uranium-bearing slabs.

23186 **(PB—83-154153) Final environmental impact statement for remedial action standards for inactive uranium processing sites (40 CFR 192) Volume I. Final report.** (Office of Radiation Programs, Washington, DC (USA)). Oct 1982. 252p. NTIS, PC A12/MF A01.

The Environmental Protection Agency is issuing final standards for the long-term control of tailings piles at inactive uranium processing sites and for cleanup of contaminated open land and buildings. These standards apply to tailings at locations that qualify for remedial actions under Title I of Public Law 95-604, the Uranium Mill Tailings Radiation Control Act of 1978. This Act requires EPA to promulgate standards to protect the environment and public health and safety from radioactive and nonradioactive hazards posed by residual radioactive materials at the twenty-two uranium mill tailings sites designated in the Act and at additional sites where these materials are deposited that may be designated by the Secretary of the Department of Energy. The Final Environmental Impact Statement (Volume I) examines health, technical considerations, costs, and other factors relevant to determining standards. Volume II contains EPA's responses to comments on the proposed standards and the Draft Environmental Impact Ststement.

0540 Health And Safety

REFER ALSO TO CITATION(S) 23117, 23184, 24389

23187 (ANL/NESC—824) UDAD; uranium dispersion & dosimetry model. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Zielen, A.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048824.

A maximum of 80 sources may be specified. The UDAD default is 240 receptor locations corresponding to the intersections in a grid pattern of 16 wind sectors and 15 radial distances. Any set of 0-15 distances in the range 0.1 to 99.9 km. may be selected. Reference report, NUREG/CR-0553 (ANL/ES-72).

The Uranium Dispersion and Dosimetry (UDAD) program provides estimates of potential radiation exposure to individuals and to the general population in the vicinity of a uranium processing facility such as a uranium mine or mill. Only transport through the air is considered. Exposure results from inhalation, external irradiation from airborne and ground-deposited activity, and ingestion of foodstuffs. Individual dose commitments, population dose commitments, and environmental dose commitments are computed. The program was developed for application to uranium mining and milling; however, it may be applied to dispersion of any other pollutant.IBM370,303x; FORTRAN IV (94%), PL/I (4%), and Assembly language (2%). The only use of PL/I is the auxiliary plotting program, CONTOUR. The only use of Assembly language is the DATE, Gregorian calendar date routine.; OS/370; 430K bytes of memory are used.

23188 (ONWI—424) Search of the Russian scientific literature for the descriptions of the medical consequences of the Kyshtym accident. Parker, F.L. (Vanderbilt Univ., Nashville, TN (USA). Dept. of Environmental and Water Resources Engineering). Mar 1983. Contract AC06-76RL01830. 148p. NTIS, PC A07/MF A01. Order Number DE83009224.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report describes a study concerning the nuclear waste accident at Kyshtym in the Soviet Urals in 1958. Soviet medical literature, interviews with potentially knowledgeable people, and the Samizdat Writing (underground documents smuggled to the West and/or surreptitiously circulated in the Soviet Union), were studied to attempt to determine what injuries or deaths, if any, occurred as a result of the event. All of the cases of radiation exposure discussed in the various literature searched seemed to be typical occupational or therapy overdoses. No allusion to the massive numbers reportedly irradiated in the accident appears in the literature searched. Evidently, these data are classified and not discussed in the open literature. This study also resulted in a modification of our understanding of the accident's cause; i.e., perhaps there was no single cause. At present, the best supposition is that there were many releases of wastes to the river system over time, plus an explosion in the fuel reprocessing plant, and that would help to explain the widespread distribution of nuclides. The lack of short-half-lived nuclides relative to long-lived ones can also be explained by the release over an extended period and the time between the accident and the beginning of the studies.

23189 Calculation of the probability of volcanic disruption of a high-level radioactive waste repository within southern Nevada, USA. Crowe, B.M.; Johnson, M.E.; Beckman, R.J. (Los Alamos National Lab., NM (USA)). *Radioactive Waste Management and the Nuclear Fuel Cycle;* **3**: No. 2, 167-190(Dec 1982).

The Nevada Test Site (NTS) area, currently under investigation for disposal of high-level radioactive waste, is located within a north-northeast trending belt of basaltic volcanism that has been active during Quaternary time. Calculations of the probability of disruption of a repository at the NTS by basaltic volcanic activity have been completed as one of a number of approaches to assessing the risk of volcanism. A mathematical model derived for these calculations is described.

0550 Regulations

REFER ALSO TO CITATION(S) 23102, 23149

23190 (CONF-830423—1) Isotope correlations for safeguards surveillance and accountancy methods. Persiani, P.J.; Kalimullah. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83007749.

From 5. symposium on safeguards and nuclear material management; Versailles, France (19 Apr 1983).

Portions are illegible in microfiche products.

Isotope correlations corroborated by experiments, coupled with measurement methods for nuclear material in the fuel cycle have the potential as a safeguards surveillance and accountancy system. The US/DOE/OSS Isotope Correlations for Surveillance and Accountancy Methods (ICSAM) program has been structured into three phases: (1) the analytical development of Isotope Correlation Technique (ICT) for actual power reactor fuel cycles; (2) the development of a dedicated portable ICT computer system for in-field implementation, and (3) the experimental program for measurement of U, Pu isotopics in representative spent fuel-rods of the initial 3 or 4 burnup cycles of the Commonwealth Edison Zion -1 and -2 PWR power plants. Since any particular correlation could generate different curves depending upon the type and positioning of the fuel assembly, a 3-D reactor model and 2-group cross section depletion calculation for the first cycle of the ZION-2 was performed with each fuel assembly as a depletion block. It is found that for a given PWR all assemblies with a unique combination of enrichment zone and number of burnable poison rods (BPRs) generate one coincident curve. Some correlations are found to generate a single curve for assemblies of all enrichments and number of BPRs. The 8 axial segments of the 3-D calculation generate one coincident curve for each correlation. For some correlations the curve for the full assembly homogenized over core-height deviates from the curve for the 8 axial segments, and for other correlations coincides with the curve for the segments. The former behavior is primarily based on the transmutation lag between the end segment and the middle segments. The experimental implication is that the isotope correlations exhibiting this behavior can be determined by dissolving a full assembly but not by dissolving only an axial segment, or pellets.

23191 (K/OA—5014) Gamma-ray spectrometric determination of UF_6 assay with 1 percent precision for international safeguards. Part 1: product and feed in 1S and 2S sample cylinders. Ricci, E. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). 15 Jun 1981. Contract W-7405-ENG-26. 25p. NTIS, PC A02/MF A01. Order Number DE81025510.

Portions are illegible in microfiche products.

The method is based on counting the 186-keV gamma rays emitted by ^{235}U using a Pb-collimated Ge(Li) detector. Measurements of fifty UF_6 product and feed cylinders reveal the following precisions and counting times: Product - 2S, 0.98% (600 s); Feed - 2S, 0.48% (2500 s); Product - 1S, 0.62% (1000 s); Feed - 1S, 0.73% (3000 s). A 1% precision is desired for variables - attributes verification measurements of ^{235}U assay in UF_6 sample cylinders for safeguards inspections by the International Atomic Energy Agency (IAEA). Statistically, these measurements stand between fine, high-precision (or variables) measurements and gross, low-precision (or attributes) ones. Because of their intermediate precisions, the variables-attributes measurements may not require analysis of all samples, and this could result in significant savings of IAEA inspector time. Although the precision of the above results is satisfactory, the average relative differences between gamma-ray and mass-spectrometric determinations for the last two sets of measurements (1S cylinders) have positive biases.

23192 (LA—9633-MS) Vehicle monitors for domestic perimeter safeguards. Fehlau, P.E.; Garcia, C. Jr.; Payne, R.A.; Shunk, E.R. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 47p. NTIS, PC A03/MF A01. Order Number DE83008272.

This report compares several types of special nuclear material monitors used to search motor vehicles at area exit gates. These monitors use either portable, hand-held instruments or stationary radiation detection instruments. Stationary monitors have a detector portal or a detector array located in the roadbed at a vehicle exit. Static measurements and operational evaluation provide a performance comparison of three types of monitors: hand-held instruments, vehicle portals, and a high-sensitivity roadbed monitor. Still higher sensitivity is possible by placing detectors overhead as well as in the roadbed; such a combined monitor does not yet exist, but the report estimates its performance. The cost for a combined monitor increases significantly when both a canopy and a roadbed detector pit are constructed; however, the performance of the combined monitor exceeds that obtained with other monitor configurations. 27 figures, 6 tables.

23193 (LA—9665-MS) Active neutron coincidence counting for the assay of MTR fuel elements. Sher, R. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 51p. (ISPO—186). NTIS, PC A04/MF A01. Order Number DE83009275.

The active well coincidence counter (AWCC) and the neutron coincidence collar (CC) were investigated for their suitability to assay materials testing reactor (MTR) fuel elements. The AWCC was used with its special insert to hold the fuel element and interrogation source. The CC was modified by the addition of polyethylene liners 2.5 cm (1 in.) thick on the sides. For a typical MTR element ($\sim$ 220 g ^{235}U) and 1000-s count times, statistical errors were $\sim$ 1.6% for the CC and $\sim$ 0.6% for AWCC. For either instrument, the change in count rate corresponding to the removal or addition of one fuel plate (with an 18-plate element) was $\sim$ 3.8%; thus, either instrument can detect removal of one plate. The AWCC can also detect removal of one plate in count times that are considerably less than 1000 s. Various functions were investigated to fit the coincidence count rate vs ^{235}U mass curve for the AWCC. Programs have been written for the Hewlett-Packard HP-97 calculator to calculate the calibration constants of these functions by a least-squares technique. Coincidence count rates in the AWCC depend on the orientation of the plates of the fuel elements because of the counting efficiency variation in the insert. To lessen this dependence, the MTR element should be counted with its plates positioned vertically, that is, parallel to the radius of the device. For the collar, the effect of plate orientation is much smaller.

23194 (NBL—308) Progress report for the period October 1981-September 1982. (Department of Energy, Argonne, IL (USA). New Brunswick Lab.). Feb 1983. 108p. NTIS, PC A06/MF A01. Order Number DE83009166.

Portions are illegible in microfiche products.

The mission-related activities of the DOE New Brunswick Laboratory involving development, calibration, and evaluation of nuclear material measurement technology and providing measurement-related services for the Government during the period are described and summarized.

23195 (NUREG—0525-Rev.6) Safeguards Summary Event List (SSEL). (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Safeguards). Feb 1983. 49p. NTIS, PC A03/MF A01 - GPO $5.00. Order Number DE83901665.

The Safeguards Summary Event List (SSEL) provides brief summaries of several hundred safeguards-related events involving nuclear material or facilities regulated by the US Nuclear Regulatory Commission (NRC). Events are described under the categories of bomb-related, intrusion, missing and/or allegedly stolen, transportation, vandalism, arson, firearms, radiological sabotage and miscellaneous. The information contained in the event descriptions is derived primarily from official NRC reporting channels.

23196 (NUREG—0907) Acceptance criteria for determining armed response force size at nuclear power plants. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Material Safety and Safeguards). Feb 1983. 13p. NTIS, PC A02/MF A01 - GPO $3.25. Order Number DE83901526.

This guidance document contains acceptance criteria to be used in the NRC license review process. It consists of a scored worksheet and guidelines for interpreting the worksheet score that can be used in determining the adequacy of the armed response force size at a nuclear power reactor facility.

23197 (TID—7029) Selected measurement methods for plutonium and uranium in the nuclear fuel cycle. Jones, R.J. (comp.). (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). 1963. 419p. NTIS, PC A18/MF A01. Order Number DE83008143.

This publication was prepared to provide methods for measuring source and special nuclear materials in the nuclear fuel cycle when they are transferred between an AEC facility and an outside facility. The publication is divided into two parts: general considerations (introduction, standard reference materials, sampling, bulk measurements, statistics of measurement) and analytical methods (U concentration measurement, U isotopic composition measurement, Pu concentration measurement, Pu isotopic composition measurement, and supplementary methods). (DLC)

23198 Operational advanced materials control and accountability system. Malanify, J.J.; Bearse, R.C.; Christensen, E.L. (Los Alamos Sci Lab, NM, USA). *Nuclear Materials Management;* **9**: No. 4, 30-44(1980).

An accountancy system based on the Dynamic Materials Accountability (DYMAC) System has been in operation at the Plutonium Processing Facility at the Los Alamos Scientific Laboratory (LASL) since January 1978. This system, now designated the Plutonium Facility/Los Alamos Safeguards System (PF/LASS), has enhanced nuclear material accountability and process control at the LASL facility. The nondestructive assay instruments and the central computer system are operating accurately and reliably. As anticipated, several uses of the system have developed in addition to safeguards, notably scrap control and quality control. The successes of this experiment strongly suggest that implementation of DYMAC-based systems should be attempted at other facilities. 20 refs.

06 FUSION FUELS

0602 Processing

23199 (JAERI-M—9390, pp 163-177) Design study of fuel circulating system using Pd alloy membrane isotope separation method. Naito, T.; Yamada, T.; Aizawa, T.; Kasahara, T. (Mitsubishi Atomic Power Industries, Inc., Tokyo (Japan)); Yamanaka, T. Mar 1981. B. Order Number DE83780427.

From US/Japan workshop on fusion fuel handling; Tokyo, Japan (13 Oct 1980).

It is expected that the method of permeating through Pd-alloy membrances is effective for isotope separation and the refining of fuel gas. In this paper, the design study of the Fuel Circulating System (FCS) using Pb-alloy membranes is described. The study is mainly focused on the main vacuum, fuel gas refining, isotope separating, and tritium containment systems. In the fuel gas refining system, impurities are effectively removed by using Pd-alloy membranes. For the isotope separation system, the diffusion method through Pd-alloy membranes was adopted. From the standpoint of the safety and economy, a three-stage tritium containment system was adopted to control tritium release to the environment as low as possible. The principal conclusion drawn from the design study was as follows. In the FCS, while cryogenic distillation method appears to be practicable, Pd-alloy membrane method is attractive for isotope separation and the refining of fuel gas. For a large amount of tritium inventory, handling and control technologies should be completed by the experimental evaluation and development of the

components and materials used for the FCS. A three-stage containment system was adopted to control tritium release to environment as low as possible. Consideration to prevent tritium escape will be necessary for fuel gas refiners and isotope separators.

0603 By-products

REFER ALSO TO CITATION(S) 23213

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY

0701 Physical Isotope Separation

23200 Sources of separated isotopes for nuclear targetry. Newman, E. (Oak Ridge National Lab., TN). pp 229-234 of Preparation of nuclear targets for particle accelerators. Jaklovsky, J. (ed.). New York, NY; Plenum Publishing Corporation (1981). Contract W-7405-ENG-26.

The various methods of enriching isotopes are outlined with a brief discussion of the advantages and disadvantages associated with each process. Some methods are omitted. The major methods included are: (1) electromagnetic isotope separation, (2) gas-phase thermal diffusion, (3) distillation, and (4) laser isotope separation.

0702 Radiation Sources

REFER ALSO TO CITATION(S) 23170, 24113

0703 Isotopic Power Supplies

23201 (DOE/AL/22028—T1) Heat-source specification 500 watt(e) RTG. (Teledyne Energy Systems, Timonium, MD (USA)). Feb 1983. Contract AC04-83AL22028. 25p. NTIS, PC A02/MF A01. Order Number DE83006959.

Portions are illegible in microfiche products.

This specification establishes the requirements for a $^{90}SrF_2$ heat source and its fuel capsule for application in a 500 W(e) thermoelectric generator. The specification covers: fuel composition and quantity; the Hastelloy S fuel capsule material and fabrication; and the quality assurance requirements for the assembled heat source. (LCL)

23202 (LA—9673-PR) Flight-systems safety program, September 1982. Progress report. Bronisz, S.E. (comp.). (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 18p. NTIS, PC A02/MF A01. Order Number DE83008356.

This technical monthly report covers studies related to the use of $^{238}PuO_2$ in radioisotope power systems carried out for the Office of Space Nuclear Projects of the US Department of Energy by Los Alamos National Laboratory. Most of the studies discussed here are ongoing. Results and conclusions described may change as the work continues.

08 HYDROGEN

0801 Production

REFER ALSO TO CITATION(S) 23264, 23275, 23788, 23790

23203 (BMFT-FB-T—80-051) High temperature water vapor electrolysis (HOT ELLY). Doenitz, W.; Hermeking, H.; Kitzmann, I.; Koch, A.; Roettenbacher, R.; Schaefer, W.; Schmidberger, R.; Schumacher, J.; Zuelow, H.V. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Aug 1980. 273p. (In German). NTIS (US Sales Only), PC A12/MF A01. Order Number DE83750345.

Portions are illegible in microfiche products.

The objective of the project HOT ELLY (phase 1) was the demonstration of the practicability of high temperature water vapor electrolysis on a laboratory scale. Starting from basic material studies the components (using sufficiently cheap raw materials) as well as the manufacture processes of hihg temperature electrolysis cells were developed systematically. Electrolytic operation of single cells and of tubular batteries built of seriesconnected cells was shown at ambient as well as at high pressure. Long time stability of cells was demonstrated for 1000 hours. At a current density of 0.4 A/cm^2 a cell voltage of only 1.3 V was measured; therefore the specific electrical energy necessary for this method of hydrogen production is significantly lower than in conventional electrolysis processes. Engineering calculations of the whole process taking into account the actual performance data indicate that overall efficiencies of hydrogen production in the range of 40 to 50% can be expected with respect to the consumption of primary energy. Due to these laboratory results further development of high temperature water vapor electrolysis for technical application seems to be promising.

23204 (EUR—8016-FR) Electrolyzer module which uses bipolar electrodes with very high catalytic activity. Final report. (Compagnie Generale d'Electricite (CGE), 91 - Marcoussis (France). Lab. de Marcoussis). 1982. 148p. (In French). European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037. Order Number DE83901208.

The aim of this program was to demonstrate the feasibility of a 5 kW water electrolyser (6 cells of 500 cm^2 active area). Cell-components, namely mono and bi-polar electrodes, and diaphragms were manufactured at a size of 500 cm^2 active area. Electrodes are made of one or two porous sintered nickel layers attached on one or both faces of a thin nickel sheet. Catalyst is then deposited inside the porosity by impregnation, drying and heat treatment. A molybdenum-nickel mixed oxide is used for both cathode and anode. Two cell-stack structures based on the filter-press principle were developed. They include circular frames and gaskets, integrated manifolding for the supply of KOH solution and the collection of hydrogen and oxygen, and spacers. Electrolyte loop is designed to work at a 30 bar pressure, 120°C with 35% KOH solution. It is essentially made out of 310 stainless steel and nickel. Tests were performed using the potassium titanate diaphragms. The initial electrochemical performance was 2 volt/cell at a 1 A/cm^2 c.d., 30 bars, 120°C. The effect of pressure from 23 bars to 30 bars was slightly beneficial. The effect of electrolyte flow rate was also measured. Three tests were performed using a thin woven asbestos fabric as diaphragm. The effect of the operating parameters, pressure, temperautre, electrolyte flow rate, was studied experimentally, especially on the ohmic part of the cell voltage. A cell model including temperature, void fractionand current density distribution inside the cell, was analyzed. The cost analysis of the hydrogen produced by our electrolyser technique was done for a 15 MW unit.

23205 (EUR—8037-FR) Production of hydrogen by electrolysis of water under at medium temperature. Final report. Girard, B.; Hespel, C.; Kunstreich, S. (Centre d'Etudes et de Recherches de la Compagnie Electro-Mecanique, 93 - Le Bourget (France)). 1982. 332p. European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037. Order Number DE83901195.

A description is given of electrolysis cells, equipment, results of corrosion tests and measurements as well as diagrammatic illustrations of hydrogen production equipment employed. Diagrams are also given of electric circuitry as well as an evaluation of the equipment's performance.

23206 (PB—83-132233) Development and parametric testing of alkaline water electrolysis cells for hydrogen production based on inorganic-membrane-electroylet technology. Final report. Vandenborre, H.; Baetsle, L.H. (Commission of the European Communities, Luxembourg). [nd]. 111p. NTIS, PC E06/MF E06.

In order to make electrolytically produced hydrogen competitive with hydrogen derived from fossil fuel sources, the advanced electrolyser technologies have to increase their hydrogen generation rate per unit cell area and to decrease the electrical power input. The main problem in the development of advanced alkaline water electrolysis is to find a replacement for chrysotile as-

bestos which is currently used as the gas separating material. A polyantimonic acid based membrane, which is stable in a strong alkaline environment at temperatures up to 120C, has been developed, followed by parametric tests combined with endurance tests.

23207 **(PB—83-132928) Photocatalytic production of hydrogen from water, using sunlight. Final report.** Mackor, A. (Commission of the European Communities, Luxembourg). [nd]. 82p. NTIS, PC E05/MF E05.

Three approaches to the photochemical cleavage of water are described, of which one, the monolayer approach, was abandoned after investigation. The solution approach concentrated on the generation of hydrogen from aqueous solutions, containing a light-absorbing compound, an energy-transferring agent, a catalyst, and an electron-donating substrate. Developments are taking place toward a hybrid form of the solution and semiconductor systems.

23208 **(PB—83-133280) Photochemical dissociation of water adsorbed in artificial membranes made from phyllosilicates. Final report.** Fripiat, J.J.; Abdo, S. (Commission of the European Communities, Luxembourg). [nd]. 113p. NTIS, PC E06/MF E06.

The aim of the project was to construct an artifical solid-state system capable of dissociating water photochemically at the gas-solid interface.

23209 **(PB—83-133348) Photosynthetic hydrogen evolution by chloroplasts and algae and on a chloroplast battery.** Trebst, A. (Commission of the European Communities, Luxembourg). [nd]. 87p. NTIS, PC E05/MF E05.

With the aim of splitting water photosynthetically and evolving hydrogen and oxygen in the light by chloroplasts, a two compartment system was developed to evolve oxygen by photosystem II in one compartment and hydrogen by photosystem I in the other. The connection between the two compartments was made electrically so that a chloroplast battery emerged. It is claimed that this is the first time a photosynthetic system has been able to generate a current in the light rather than only a potential.

23210 **(PB—83-144329) The photochemical dissociation of water by means of visible light.** Harriman, A.; Porter, G. (Commission of the European Communities, Luxembourg). [nd]. 150p. NTIS, PC E06/MF E06.

Photosynthesis (PS) is claimed to provide the only practical means for the collection and storage of solar energy. This is achieved by coupling two photoreactions; one reaction (PSI) reduces CO2 to the level of a carbohydrate whilst PSII leads to the oxidation of water to molecular oxygen. This second step is of current interest since it is capable of storing solar energy in the form of a chemical fuel. QH2 can be regarded as a chemical fuel and, in principle at least, can be converted into a higher grade fuel.

23211 **Photocatalytic production of hydrogen from water by a p- and n-type polycrystalline iron oxide assembly.** Leygraf, Ch.; Hendewerk, M.; Somorjai, G.A. (Univ. of California, Berkeley). *Journal of Physical Chemistry;* 86: No. 23, 4484-4485(11 Nov 1982). Contract AC03-76SF00098.

The photodissociation of water to produce hydrogen has been accomplished with light in the solar range of the electromagnetic spectrum and in the absence of any external potential at 300 K. The catalyst for the reaction is a polycrystalline p/n diode assembly made out of Mg- and Si-doped iron oxide. In O.1 M Na_2SO_4 solution (pH 6) the device produces hydrogen catalytically with rates of 1-2 H_2 molecules per site per minute and its power conversion efficiency is about 0.05%. Iron oxide containing minerals could have played important roles in the photochemical evolution of the planet in the prechlorophyl era.

23212 **Synopsis of results of the first programme on the production and utilization of hydrogen within the energy R+D programme of the Commission of the European Communities (1975-1979).** Imarisio, G.; Toussaint, J.C. Luxembourg; Commission of the European Communities (1982). 638p. (EUR—8054-EN).

Within the hydrogen subprogramme, research is subdivided into three major tasks or "projects": Project A: Thermochemical Hydrogen Production. Project B: Electrolytic Hydrogen Production. Project C: Hydrogen Utilization and Storage. The results obtained in the course of the first R and D programme have been reported by the Commission's contractors in final reports, published in the EUR series and available from the Sales Offices listed at the end of this book. This book collects all the extended abstracts of these reports, and thus presents in a synthetic form a complete picture of the achievements obtained in the first programme, which may be of help for a more efficient and wider diffusion of the scientific knowledge developed. All the contractual data, as well as the report number and the name of the scientist reponsible, are listed in Appendix A, speed up eventual direct scientific exchanges. A second appendix (B) gives the titles of the projects and the names of the contractors selected for the second R and D programme, subprogramme on hydrogen, updated to 30 June 1982. The corresponding extended abstracts will be published at a later date.

23213 **An operating high temperature (1000°C) electrolysis demonstration unit.** Horn, F.L.; Powell, J.R.; Fillo, J.A. (Brookhaven Natl Lab, Upton, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1732-1734(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Phase I of the BNL Fusion Synfuel Demonstration Program has been the successful construction and demonstration of a 100-w electrical-heated, high-temperature electrolysis unit operating at a temperature of 1000°C. The high-temperature electrolyzer demonstration unit consists of 34 yttria-stabilizer zirconia tubes contained in a 15-cm (o.d.), 30-cm long INCONEL pressure vessel. The tubes are 25-cm long (active length), 0.64-cm (o.d.), and coated on the inside with platinum to form the oxygen electrode and coated on the outside with nickel to form the hydrogen electrode. The 1000°C steam is raised by electrically heating water. The system is designed to produce approximately 6 cc/s of hydrogen.

0802 Storage

23214 **(CONF-810497—4) Hydrogen absorption and temperature programmed desorption (TPD) studies of iron- and chromium-substituted ZrV_2.** Mendelsohn, M.H.; Gruen, D.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007754.

From International symposium on metal-hydrogen systems; Miami Beach, FL, USA (13 Apr 1981).

Portions are illegible in microfiche products.

The hydrogen absorption proterties of the alloys Zr(V/sub 1-x/Cr/sub x/)$_2$, x = 0.4 and 0.5, were studied at 450°C from 10^{-3} atm to 10 atm. the alloy ZrV/sub 0.8/Cr/sub 1.2/ was studied at 350°, 400°, and 450°C from 10^{-3} atm to 10 atm, and from these data partial molar enthalpies and entropies of solution were calculated for several hydride compositions. A free energy against cell volume plot of the cubic chromium-containing materials compared with earlier data on hexagonal as well as cubic iron-substituted alloys shows that electronic factors are probably more important than structural factors in determining the free energies of the ternary Zr(V/sub 1-x/B/sub x/)$_2$ systems. Temperature-programmed desorption (TPD) of several hydride compositions in the systems ZrV/sub 1.6/Fe/sub 0.4/H/sub y/ and ZrV/sub 1.2/Cr/sub 0.8/H/sub y/ revealed two distinct peaks. The TPD results appear to correlate with changes in the pressure-composition isotherms when plotted on a log-log plot. These changes may be related to thermodynamic changes in the desorption of hydrogen. The so called trapping model (Pfeiffer and Wipf, 1976; Flanagan, Wulff, and Bowerman, 1980) is presented as a possible explanation of the observed TPD behavior. 7 figures, 2 tables.

23215 **(CONF-810497—5) Getting metal-hydrides to do what you want them to.** Gruen, D.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 25p. NTIS, PC A02/MF A01. Order Number DE83007764.

From International symposium on metal-hydrogen systems; Miami Beach, FL, USA (13 Apr 1981).

Portions are illegible in microfiche products.

With the discovery of AB_5 compounds, intermetallic hydrides with unusual properties began to be developed (H dissociation pressures of one to several atmospheres, extremely rapid and reversible adsorption/desorption very large amounts of H adsorbed). This paper reviews the factors that must be controlled in order to modify these hydrides to make them useful. The system $LaNi_5 + H_2$ is used as example. Use of AB_5 hydrides to construct a chemical heat pumps is discussed. Results of a systematic study substituting Al for Ni are reported; the HYCSOS pump is described briefly. Use of hydrides as hydrogen getters (substituted ZrV_2) is also discussed. Finally, possible developments in intermetallic hydride research in the 1980's and the hydrogen economy are discussed. 10 figures. (DLC)

23216 **(CONF-811276—1) Materials engineering of metal hydrides.** Gruen, D.M.; Mendelsohn, M.H. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83007860.

From Materials engineering conference; Haifa, Israel (20 Dec 1981).

Intermetallic hydrides of the AB_5 type have enthalpies in the range valid for chemical heat pumps. A scheme for manufacturing hydrides with optimal properties for a chemical heat pump is described, using LaNi/sub 5-x/Al/sub x/ and ZrV/sub 2x/Cr/sub x as examples. The Laves-phase ternary hydrides appear to be good candidates for gettering hydrogen in the Tokamak Fusion Test Reactor. (DLC)

0804 Marketing And Economics

REFER ALSO TO CITATION(S) 23790

09 OTHER SYNTHETIC AND NATURAL FUELS

REFER ALSO TO CITATION(S) 23727

0901 Hydrocarbon Fuels

REFER ALSO TO CITATION(S) 22921, 23270, 23272, 23274, 23279, 23282, 23871, 23873, 23874, 23876, 24057

23217 **(BMFT-FB-T—79-102) Fuel of MSW.** Bracker, G.P.; Sonnenschein, H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 111p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750318.

Portions are illegible in microfiche products.

The CEA process, tested in USA, has been checked with regard to its transferability to German conditions with the following results: Since the composition of MSW in Germany differs considerably from the composition of MSW in the USA regarding its yield, analysis and distribution of particle size the process has to be modified accordingly. With regard to the possibility of an application of the process, the chlorine content of the fuel still represents a problem. As it is <- 0.7%, it is much higher than for coal and fuel oil. An analysis of the possibility of applying the process in Germany showed that based on the present situation at least 25 plants could be realized, 5 of them at short notice. A comparable hypothetical project has shown that a production cost of DM 37.75/t MSW can be obtained.

23218 **(CONF-781110—18) Design and modeling of low-pressure-drop methanation reactors.** Schehl, R.R.; Haynes, W.P. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1978. 28p. NTIS, PC A03/MF A01. Order Number DE83008430.

From 71. meeting of the AICHE; Miami, FL, USA (12 Nov 1978).

This paper discusses the design and operation of low-pressure-drop methanation systems under development at the Pittsburgh Energy Technology Center. Mathematical models, supported by bench-scale studies, are outlined and their applicability to large-scale systems is tested with operating data from Process Development Units. 14 figures.

23219 **(DOE/NBM—3008218) Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography.** Diffenbach, R.A.; Schehl, R.R.; Fauth, D.J. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1980. 30p. NTIS, PC A03/MF A01. Order Number DE83008218.

When comparing catalysts on a spece-time-yield basis, the potassium-promoted iron-cobalt catalyst and the potassium-promoted iron catalyst are the most active. While the iron-manganese catalyst is quite active on a per gram of iron basis, on a per gram of catalyst basis it is only about 20% as active as the potassium-promoted precipitated iron catalyst. The fused iron catalyst is the least active of any catalyst studied, but this catalyst was reduced at 723°K (vs 523°K for the precipitated iron catalyst). This catalyst can be reduced at 623°K in about ten hours, and considering the large effect of reduction temperature on carbiding rate, there is reason to believe the lower reduction temperature will result in a more active catalyst. While the fused iron, iron-cobalt-potassium, and iron-manganese catalysts showed little change in conversion after being placed on-stream, the precipitated iron catalysts, B and C, declined significantly during the first 12 hours and then stabilized. Olefin selectivity as measured by the propylene/propane ratio decreases with time on-stream, although the degree of polymerization changes little during the first 50 hours. The degree of polymerization decreased in the following order: fused iron > K-promoted ppt. Fe > ppt. Fe, Fe-Mn > Fe-Co-K. As far as maximizing gasoline yield is concerned, it appears the Fe-Mn catalyst is to be preferred not only because of the high C_5-C_{11} selectivity but also because the olefin content is the highest of any catalyst in this study. 15 figures, 3 tables.

23220 **(DOE/NBM—3008230) Pilot-plant study of an adiabatic parallel-plate methanation reactor.** Haynes, W.P.; Schehl, R.R.; Weber, J.K.; Forney, A.J. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1974. 33p. NTIS, PC A03/MF A01. Order Number DE83008230.

Portions are illegible in microfiche products.

Pilot plant data are presented from a 1291 hour test on an adiabatic catalytic methanation reactor employing recycled product gas for cooling. Topics discussed include conversion, product yields, catalyst properties and deactivation rates. A mathematical model postulating an irreversible Langmuir-Hinshelwood mode of deactivation is presented and applied. 8 figures, 6 tables.

23221 **(DOE/TIC—11428) Synthesis of liquids and pipeline gas by Fischer-Tropsch.** Haynes, W.P. (USDOE Pittsburgh Energy Technology Center, PA). 1978. 3p. NTIS, PC A02/MF A01. Order Number DE83009412.

The objective of this project is to improve catalyst activity, life and selectivity by conducting tests to determine the best promoters to be added to the iron catalyst as well as to determine the optimum conditions for operation. A combination liquid fuels/high-Btu gas plant may be a desirable method for controlling the product distibution from a coal gasification plant. During the past year two bench-scale units (# 3 and # 4), the CFSTR (Berty type) reactor, and the PDU system that were used for testing methanation catalysts were modified for Fischer-Tropsch operation. Tests were conducted in the bench-scale and CFSTR units, while the first test in the PDU (shakedown run) will be initiated this month. During the year plant operation was halted for approximately four months due to a shortage of synthesis gas in February and March and for recent repair work to the steam boiler.

23222 **(PB—83-128959) Family and community biogas plants in rural India and China.** Roy, R. (Open Univ., Milton Keynes (UK). Alternative Technology Group). 1980. 32p. NTIS, PC E04/MF E04.

This report contains the basic theory of biogas production, tables of expected production, installation costs, architectural diagrams for both the Indian and Chinese plants, a case for community biogas plants in India, a pilot community biogas scheme in Uttar Pradesh, and conclusions. The conclusions were that cooking fuel should be supplied for free or deforestation would continue, not enough fuel can be generated anyway without the use of other fuels

as well in many communities, electric lighting is not a strongly felt need in most rural communities and should be introduced later, factionalist tendencies must be overcome for the scheme to work, and community biogas plants will offer a more reliable yield and may be supported by agricultural as well as animal and human wastes.

23223 **(PB—83-132225) Present state of technology of recovery and conversion process for synthetic fuels - volume II.** Caemmerer, D.; Niclauss, M.; Schinke, H. (Commission of the European Communities, Luxembourg). [nd]. 314p. NTIS, PC E12/MF E12.

Following an earlier summary report on the subject, this report expands more fully on the methods of conversion of fuels alternative to fossil fuels of the traditional kind. The most important areas for research and development are discussed, such as coal gasification and liquefaction, fermentation of alcohol, biogas production, as well as noxious substances emitted during conversion processes.

23224 **(PB—83-132407) Present state of technology of recovery and conversion process for synthetic fuels - Volume 1.** Caemmerer, D.; Niclauss, M.; Schinke, H. (Commission of the European Communities, Luxembourg). [nd]. 26p. NTIS, PC E03/MF E03.

The production of synthetic fuels from various sources is summarized in this report (volume 1 of a much fuller report). It deals with: (a) coal, by gasification and hydrogenation, (b) oil shale, (c) biomass, six basic methods are considered and (d) hydrogen, which could take a leading role in the future. Aspects which are considered are the economics of the processes, a study of the degree of conversion and energy balance, pollution effects on atmosphere, land, water and health, and applications of the synthetic fuels. Technical problems encountered in the development of the synfuel processes are outlined and suggestions are made for possible future research.

23225 **(PB—83-133124) Gas generation of low b.t.u. fuel gas from agricultural residues. Final report.** (Commission of the European Communities, Luxembourg). [nd]. 11p. NTIS, PC E03/MF E03.

A general description is given of the technology of dual combustion engines, specially designed for use with low-grade gas obtained from generators using biological materials. Several of these engines are in service, under fabrication, or on order. Satisfactory gasification has been obtained with the following combustibles: wood working waste, leafy woods, tropical resinous woods, sawmill waste, non-debarked waste, maize waste, heads of sunflowers, rice husks, cotton gin residues, residual mud from paper manufacture. To be suitable for use with the engine, the gas must be clean, free from condensed volatiles, and at a low temperature. Purification techniques for the gases are described.

23226 **(PB—83-133157) Development of an energy converter for the production of heat, mechanical and electrical energy through the gasificaton of wood and straw in a batch gasifier with an output of 50-150 kw. extended to include the gasification of batched biomass with an output of 150-400 kw. Final report.** Ide, J.; Zerbin, W.O.; Linneborn, H.; Lohmann, J. (Commission of the European Communities, Luxembourg). [nd]. 62p. NTIS, PC E04/MF E04.

The gasification of wood and straw in a batch gasifier in presence of air for the production of heat, mechanical and electrical energy is described for an output ranging from 50-150 kW and from 150-400 kW. The basic data of the gasification process were derived from a mathematical model for the gasification of 1 kg carbon in presence of oxygen and air. The chemical energy contained in the gas may be used for the production of heat and for the production of mechanical and electrical energy; combustion in gas engines or gas turbines was found to be almost stoichiometric. The utilization of generator gas in gas engines requires tar-free gas for the entire output range. Wood was used for the experiments as briquetted straw, suitable for the batch gasifier.

23227 **Cord wood gasification and gas combustion system.** Payne, F.A.; Alphin, J.G.; Bunn, J.M. (Clemson Univ, SC, USA). *ASAE (American Society of Agricultural Engineers) Technical Paper;* No. 81-3589, 25(1981). (CONF-811221—).

From American Society of Agricultural Engineers meeting; Chicago, IL, USA (15 Dec 1981).

A 1.0 Gj/hr cord wood gasifier-combustor was designed and tested. Two-staged combustion of cord wood up to a diameter of 15.2 cm was achieved with a net energy efficiency of 70 to 80%. Modulation of the system output was demonstrated. The major problem encountered was loading wood into the hot gasifier on a continuous basis. ref.

0902 Alcohol Fuels

REFER ALSO TO CITATION(S) 22922, 23223, 23224, 23282, 23289

23228 **(DOE/RA/50362—1395-Vol.2-Pt.1) Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate.** (Fluor Engineers and Constructors, Inc., Irvine, CA (USA)). 1982. Contract FG01-81RA50362. 428p. NTIS, PC A19/MF A01. Order Number DE83008565.

Portions are illegible in microfiche products.

This section summarizes the significant results of Fluor's work in the Dunn-Nokota Methanol Project Feasibility Study: (1) preliminary design of the process plant and supporting facilities; cost estimates for the facilities and health and safety assessments related to the process plant. In addition to the base case methanol plant design and cost estimates, several alternative cases were investigated in less detail. The plant is designed to convert North Dakota lignite coal into chemical grade A methanol and other marketable by-products. The plant will receive run-of-mine coal at the plant site and will generate sufficient electrical power to meet normal plant and mine requirements. The plant has been designed with sufficient multiple trains, spare equipment and intermediate storage to provide an overall on-steam factor of 95%. In addition, the plant has been designed to be constructed in two phases with each phase having facilities to produce 50% of the total plant capacity. The lignite is crushed and screened and the sized coal is fed to Lurgi gasifiers where it is gasified under pressure in the presence of steam and oxygen to produce a raw synthesis gas. The raw gas is cooled and cleaned in downstream units to remove water, heavy hydrocarbons, sulfur compounds, and carbon dioxide. The purified gas, containing primarily carbon monoxide and hydrogen, is compressed and converted into methanol in the presence of a catalyst. The crude methanol is purified by distillation, producing chemical grade A product. Methane produced in the gasification process is converted into additional synthesis gas and subsequently into methanol. Condensed hydrocarbon and chemical liquids are separated and upgraded into marketable by-products. Sulfur compounds removed from the raw gas are converted into an elemental sulfur by-product. Carbon dioxide removed from the raw gas is purified and compressed for sale.

23229 **(DOE/RA/50362—1395-Vol.2-Pt.2) Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate.** (Fluor Engineers and Constructors, Inc., Irvine, CA (USA)). 1982. Contract FG01-81RA50362. 394p. NTIS, PC A17/MF A01. Order Number DE83008566.

Portions are illegible in microfiche products.

This volume continues plant engineering studies as follows: water supply, solid waste (characteristics and disposal methods), sulfur balance, emissions, discussion of certain plant processes and start-up procedures, product and by-product specifications, construction plan, capitalized and operating cost estimates, alternative design and process studies, processing of contaminated methanol, purchase of electric power as power generation, cost reduction studies, carbon dioxide incineration (to burn impurities if no market develops), health hazard analysis (including regulations, control measures and monitoring and surveillance), and safety analysis (including regulation and control). (LTN)

23230 (DOE/RA/50362—1395-Vol.3) Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume III. Market analysis. (Purvin and Gertz, Inc., Dallas, TX (USA)). 1982. Contract FG01-81RA50362. 337p. NTIS, PC A15/MF A01. Order Number DE83008567.

Portions are illegible in microfiche products.

The major objective of this market analysis study was to identify and quantify the markets that could use the methanol produced from the Dunn-Nokota project if it were reliably available at competitive prices. Analysis of the traditional chemical markets for methanol indicated that the large quantities of methanol to be produced could not be totally marketed to the chemical industry. Only a small portion of the plant's output will most likely move into this market. Thus, other markets had to be investigated for potential use of methanol. Since methanol is an excellent liquid fuel, the fuel markets became the logical focus for these investigations. The analysis of the fuel markets indicated that methanol could generally be used to replace conventional hydrocarbon fuels. This would include direct substitution in gasoline and diesel engines for transportation uses, and gas turbines and boilers for utility power generation and industrial use. Methanol could also be mixed with gasoline or diesel fuel for transportation use. The premium fuel market for methanol will be as a low percentage (probably 4% to 8% by volume) blend component in unleaded gasoline. It most likely will be used as an octane enhancer, although it could be used in significant quantities as a gasoline extender should gasoline supplies become scarce. Other fuel uses will result in a significant decrease in return to Nokota. The other fuel uses considered to have a potential for methanol penetration include direct burning in gasoline engines, replacement for distillate fuel for peak power generation and industrial boiler fuel, and as a substitute or extender for diesel fuel in transit bus fleets or railroad locomotive engines. The breakeven values required before methanol would begin penetrating any of the above fuel markets have been estimated by Purvin & Gertz.

23231 (DOE/RA/50362—1395-Vol.5) Dunn-Nokota methanol project, Dunn County, North Dakota. Volume V. Economic and financial analysis. (Dillon, Read and Co., Inc., New York (USA)). 1982. Contract FG01-81RA50362. 109p. NTIS, PC A06/MF A01. Order Number DE83008569.

The economic and financial feasibility studies comprised both a review of the general considerations involved in devising a financing plan for the Dunn-Nokato Project and quantitative analyses of project economics based on a computer model. Since The Nokota Company does not have the financial resources to provide the equity capital necessary to fund the Project, and since other equity sponsors have not yet been identified, a definitive financing plan cannot be determined at this time. However, an investigation of the characteristics necessary to any suitable financing plan for the Project was undertaken, included in: (1) a survey of possible sources of debt funds; (2) a discussion of the risks as perceived by lenders and the ways in which these can be addressed; (3) an analysis of the considerations involved in selecting a legal and financial structure; and (4) a review of available government support options under the Energy Security Act. The results of this work are summarized. The quantitative analysis developed pro forma financial statements over the life of the Project, calculated relevant rates of return for the Project, and generated various statistical measures of Project crediworthiness, based on information supplied by Nokota and Project consultants. These anlayses indicate that, under the scenario judged to be most reasonable by Nokota and Project consultants, the Project is economically and financially viable. The economics of the Project under the base case design alternative were compared to the economics of other process design alternatives for which cost and output estimates had been prepared by Fluor. In addition, sensitivity analyses quantifying the effect of changes in key assumptions were performed.

23232 (DOE/RA/50362—1395-Vol.6) Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis. (Hamel, Park, McCabe and Saunders, Washington, DC (USA); Atkinson, Dwyer and Klemin, Bismarck, ND (USA)). 1982. Contract FG01-81RA50362. 431p. NTIS, PC A19/MF A01. Order Number DE83008570.

The objective of the Tax, Legal and Regulatory Analysis section of the study was to evaluate the basic tax, legal and regulatory premises upon which the Project and other parts of the study are based. The major part of these analyses concern federal income tax principles affecting the construction of a large-scale alternative energy project, particularly the application of the investment and energy tax credits, the recovery of costs through depreciation, treatment of pre-construction expenditures, capitalization of real property construction period interest, and leasing and project organization principles. Portions of the tax analysis were revised after their completion because of the passage in late August of the Tax Equity and Fiscal Responsibility Act of 1982 (the 1982 Tax Act), which makes important changes in the law. North Dakota state principles are also discussed. The balance of the legal report deals with non-income tax and tariff matters, permit requirements, federal coal leasing principles, prehistory and cultural resources, legal title to the project site, Federal Clean Air Act considerations, and other regulatory matters.

23233 (DOE/RA/50362—1395-Vol.7-App.) Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments. (Dames and Moore, Los Angeles, CA (USA)). 1982. Contract FG01-81RA50362. 477p. NTIS, PC A21/MF A01. Order Number DE83008559.

Portions are illegible in microfiche products.

The environmental and socioeconomic aspects of the Dunn-Nokota Methanol Project are the subject of this volume (Volume VII). Appendices A and B present, respectively, additional information on methods of investigation and data collected for many aspects of the physical and human environment addressed in Sections 4 through 8.

23234 (DOE/RA/50362—1395-Vol.7-Pt.1) Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments. (Dames and Moore, Los Angeles, CA (USA)). 1982. Contract FG01-81RA50362. 412p. NTIS, PC A18/MF A01. Order Number DE83008571.

Portions are illegible in microfiche products.

The environmental and socioeconomic aspects of the Dunn-Nokota Methanol Project are the subject of this volume (Volume VII). Section 2 summarizes the results of the environmental feasibility studies for the Dunn-Nokota Methanol Project. (This summary, as well as one for each volume of the Final Report, is contained in Volume I, Executive Summary.) Section 3 describes the scope of the environmental studies including the general methodology employed. Sections 4, 5, and 6 address the existing environment, environmental impacts, and mitigation measures, respectively, of the plant, mine, and utility corridor sites. Relevant aspects of the physical and human environment are discussed in each of these sections. The water supply pipeline and intake are the subject of Section 7, which includes a description of the pipeline, its routing, and the existing environment; an assessment of environmental impacts; and possible mitigation measures. The product transportation systems, including pipeline, rail, and truck, are the subject of Section 8. Alternatives to the Project are addressed in Section 9. Section 10 is a comprehensive bibliography of references cited and consulted. Appendices A and B present, respectively, additional information on methods of investigation and data collected for many aspects of the physical and human environment addressed in Sections 4 through 8.

23235 (DOE/RA/50362—1395-Vol.7-Pt.2) Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments. (Dames and Moore, Los Angeles, CA (USA)). 1982. Contract FG01-81RA50362. 367p. NTIS, PC A16/MF A01. Order Number DE83008572.

Portions are illegible in microfiche products.

This section presents the analysis of the impacts of the construction and operation of the proposed plant, mine, and utility corridor on the existing environment. Many of the analyses are based on assumptions regarding the amount of land disturbance during project operation; these assumptions are summarized in Table 5.0-1. The analyses also assume that reclamation of lands disturbed by mining and associated activities will proceed in an environmentally sound manner and as contemporaneously as practicable with the surface coal mining operations. Although the reclamation law re-

quires all reclamation through initial planting to be complete no later than 3 years from completion of mining operations, it is expected that reclamation through seeding will be complete within 2 years of mining. Following seeding, it is expected that approximately 5 years will be needed to establish a vegetative cover and growth that will be equal to or better than that which existed prior to mining. Therefore, the impact analysis assumes that the period from initial mining disturbance through reclamation is 7 years. The reclamation law, however, requires the mine operator to assume responsibility for successful reclamation for 10 years after final seeding. This volume also deals with the plant water supply; product transport by pipeline, railway and trucks; and contains a bibliography.

23236 (DOE/RA/50362—1395-Vol.8) **Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VIII. Coal quality analysis.** (Boyd (John T.) Co., Pittsburgh, PA (USA)). 1982. Contract FG01-81RA50362. 322p. NTIS, PC A14/MF A01. Order Number DE83008560.

Portions are illegible in microfiche products.

John T. Boyd Company's assignment for the Dunn-Nokota Methanol feasibility study was to determine the quality of the Dunn Center lignite seams for the area studies, both on an in-place and run-of-mine basis. Previous available quality data was reviewed, absence of required data noted, and a new drilling program designed to complete the data base. Additional core samples were taken in March, April, and October of 1981, analyzed and the quality weight-averaged with previous data to develop average field quality. A geological reserve study was completed in 1980 by Boyd Company which incorporated information from 747 rotary holes and quality from 52 cores holes. Of these core holes, 32 have influence in the area of interest used for this study. The laboratory analysis from the 32 core holes within the area of interest are summarized in this subsection. The data are reported on in-place dry, in-place as-received, and in-place equilibrium moisture bases and adjusted for out-of-seam dilution to the run-of-mine, equilibrium moisture basis. Laboratory analysis provides the basic data to compute field quality Table 2-1 presents the previous quality data on an in-place, dry basis by seam.

23237 (PB—83-140129) **A brief summary of the technical feasibility, emissions, and fuel economy of pure methanol engines.** Alson, J. (Environmental Protection Agency, Ann Arbor, MI (USA)). Dec 1981. 29p. NTIS, PC A03/MF A01.

In the last decade considerable research has been undertaken to evaluate methanol as an automotive fuel. This report attempts to summarize the physical and chemical properties of methanol, the comparison of such properties to those of gasoline and diesel fuels, the technical feasibility of methanol combustion in cylinder fuel-injected and cylinder fuel-inducted engines, and the exhaust emissions from methanol-fueled motor vehicles. In conclusion this report summarizes the fuel efficiency results of various studies of methanol-fueled vehicles.

23238 (PB—83-146308) **Annotated review of the technological state-of-the-art of ethyl and methyl alcohol-based fuels and determination of the economic feasibility of commercial-scale production of such fuels.** (Fuel and Mineral Resources, Inc., Reston, VA (USA)). 25 Aug 1982. 452p. NTIS, PC A20/MF A01.

This study reviews the state-of-the-art in alcohol fuels production and utilization technologies and assesses the technical and economic feasibility of commercial production of alcohol-based fuels.

23239 **Microemulsions from vegetable oil and aqueous alcohol with 1-butanol surfactant as alternative fuel for diesel engines.** Schwab, A.W.; Pryde, E.H. US Patent Application 6-423 402. 24 Sep 1982. 21p.

The energy crisis of recent years has stimulated research in the field of alternate and hybrid fuels. One area of particular interest relates to fuels for commercial and agricultural vehicles, which are typically powered by diesel engines. The prospect of farmers becoming self-sufficient in regard to their energy needs has led to investigations of vegetable oils as diesel fuel substitutes. This invention relates to a blended vegetable oil fuel which circumvents these problems.

0904 Solid Waste And Wood Fuels

REFER ALSO TO CITATION(S) 23227

13 HYDRO ENERGY

REFER ALSO TO CITATION(S) 23731, 23732, 23733, 23734, 23735, 23736, 23737, 23738, 23739, 23742

1301 Resources And Availability

REFER ALSO TO CITATION(S) 23422

23240 (AD-A—122574/7) **Hydropower study. Blackwater Dam, Webster, New Hampshire. Reconnaissance report.** (Corps of Engineers, Waltham, MA (USA). New England Div.). Aug 1981. 61p. NTIS, PC A04/MF A01.

The principal thrust of this limited reconnaissance effort is to determine whether any economically feasible hydropower development could be undertaken at Blackwater Dam. Baseline environmental, recreational, social and cultural conditions in the study area have been identified. Due to time and funding limitations only two alternatives were considered. If the study is continued several alternatives will be evaluated.

23241 (PB—83-116236) **Hydropower from Dutch rivers: a survey of potential and restrictions.** de Graaf, F.A.M. (Energie Studie Centrum, Petten (Netherlands)). Jun 1982. 99p. (In German). (ESC—18). NTIS, PC A05/MF A01.

This report gives a survey of the energy potential of two dutch rivers as a source of renewable energy. Therefore two different technologies, to extract useful energy from rivers, have been considered. The first technology concerns the conventional and well known application of hydropower plants. The second concerns the technical possibility to extract useful energy from the mixing process of fresh water (river or other flows) with salt water of the North sea. This can be achieved on the base of osmosis. Such systems, which have not been developed or demonstrated till now, are called 'osmotic energy conversion'-systems (OEC-systems).

23242 (PB—83-142695) **Sample survey of traditional water wheels and small water turbines in nepal: a preliminary report.** Joshi, C.B. (Tribhuvan Univ., Kathmandu (Nepal). Research Centre for Applied Science and Technology). 1981. 51p. NTIS, PC A04/MF A01.

The main purposes of this survey were to study the technical, economical, and social aspects of water wheels and turbines; to assess the possibility of developing these modern and traditional technologies together or improving them separately; to assess the awareness of the local people of the need for improvement on their existing technologies; and to find out the possible role of RECAST for mutual cooperation. This survey is intended to provide planners financiers, researchers, and manufacturers with further information regarding better use of small hydro resources and locally available skills for development.

1303 Plant Design And Operation

23243 (DOE/ID/12206—1) **Theoretical and experimental investigation of the Cherepnov water lifter.** Liu, H.; Fessehaye, M. (Missouri Univ., Columbia (USA). Dept. of Civil Engineering). Jan 1983. Contract FC07-80ID12206. 255p. NTIS, PC A12/MF A01. Order Number DE83007673.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This research was conducted to assess the feasibility of using the Cherepnov lifter to augment the water head in hydroelectric power generation. The Cherepnov lifter is a device that performs

the same function as the hydraulic ram which extracts energy from water to lift a portion of the water. A theoretical analysis of the Cherepnov lifter, including computer models, and experimental tests to verify the lifter performance are discussed in this volume. The present study has identified more than ten design modifications and modes of operations of the lifter, each serving a special purpose and having unique features. Equations for predicting the behavior under each mode are presented herein. The result of this study is not only applicable to hydroelectric power generation but alos to other hydraulic practices such as water supply for municipalities, industries, farms and individual homes, and for irrigation and drainage in agriculture. In fact, the lifter is far more promising for these other purposes than for hydropower. Information on the lifter provided in this report should be useful for anyone planning to design a Cherepnov lifter for whatever purpose.

23244 (DOE/ID/12206—2) Economics of Cherepnov water lifter for low-head hydropower. Liu, H.; Geekie, R. (Missouri Univ., Columbia (USA). Dept. of Civil Engineering). Jan 1983. Contract FC07-80ID12206. 102p. NTIS, PC A06/MF A01. Order Number DE83007639.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The economic feasibility of using the Cherepnov lifter to augment the water head in small-scale hydroelectric power generation was investigated, and is reported. The economics of the cherepnov lifter for use as a pump to supply water looks very promising both for large and small systems. However, the economics of using the lifter in hydroelectric power generation is not promising, especially for large and high-head systems. This, however, does not preclude the economics or the desirability of using the lifter for microhydro low-head systems, especially if low-cost tanks are available and PVC pipes can be used. A desirable feature of the lifter separate from economical considerations is the ability of the lifter to pass fish unharmed. This feature should be taken advantage of when the lifter is used for hydropower generation.

23245 (DOE/RA/12117—3) Upper Mechanicville Hydroelectric Redevelopment Project: project-management plan. Small-Scale Hydroelectric Power Demonstration Project. (New York State Electric and Gas Corp., Binghamton (USA)). Jul 1982. Contract FC07-80ID12117. 38p. NTIS, PC A03/MF A01. Order Number DE83009353.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The purpose of this Project Management Plan (PMP) is to define the project objectives, the organizational composition of the management team, the responsibilities of all participants in the project, the project controls to be implemented, and the required reports and meetings. The New York State Electric and Gas (NYSEG) Upper Mechanicville Hydroelectric Plant is a key element in the Department of Energy's (DOE) Low-Head Hydroelectric Power Demonstration Program. This project will be funded under Cooperative Agreement No. DE-FC07-80ID12117 which terminates on December 1, 1985. This project involves the redevelopment of an abandoned and dismantled hydroelectric power generating facility. Redevelopment of the site involves the construction of the Upper Mechanicville Power Plant which will consist of two (2) vertical shaft adjustable blade Kaplan type turbines coupled to two (2) electric generators and controls. The power plant will be located in an existing intake power canal located on the west bank of the Hudson River. The power canal extends downstream from the west abutment of the existing dam owned and operated by the New York State Department of Transportation (DOT) as part of Lock No. 3 of the Champlain Division, New York State Barge Canal System. The two units are capable of providing a combined, continuous output of 16.8 MW.

1305 Economics And Management

REFER ALSO TO CITATION(S) 23244, 23245

14 SOLAR ENERGY

REFER ALSO TO CITATION(S) 23762

23246 (SEU—83/1) Solar Energy Update: a current awareness journal. Smith, L.B. (ed.). (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). Jan 1983. 313p. C. Order Number DE83009102.

Available on a subscription basis at $75.00 per volume (calendar) year.

Solar Energy Update (SEU) provides abstracting and indexing coverage of scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses, and monographs from all sources on solar energy. All information announced in SEU, plus additional backup information, is included in the energy information data base of the Department of Energy's Technical Information Center. The subject matter covered by SEU includes solar thermal, photovoltaic, and biomass conversion, ocean thermal gradient utilization, solar heating and cooling, and wind and wave energy conversion.

1401 Resources And Availability

23247 (PB—83-133785) Estimates of the daily solar radiation on orientated and inclined receiver surfaces. Final report. Dogniaux, R.; Lemoine, M. (Commission of the European Communities, Luxembourg). [nd]. 240p. (In French). (EUR—7313-FR). NTIS, PC E10/MF E10.

The aim of the research program was to devise a method for the estimation of solar energy, either direct or diffuse, falling on orientated and inclined surfaces, on the basis of observations of the amount of solar radiation falling on horizontal surfaces. The accuracy and general applicability of the results obtained by the model used are evaluated and compared with measured data from various European centers. The method of estimation, working assumptions and mathematical relationships are described and extensive tables of basic data are provided.

23248 (SOLAR/0010—79/06) Environmental data for sites in the National Solar Data Network. (International Business Machines Corp., Huntsville, AL (USA). Federal Systems Div.). Jun 1979. Contract AC01-77CS34049. 231p. NTIS, PC A11/MF A01. Order Number DE83008831.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Environmental information collected at the sites of the National Solar Data Network is presented in the form of tables for each solar site. The sites are grouped into 12 zones, each of which consists of several adjacent states. The insolation table presents the total, diffuse, direct, maximum, extraterrestrial radiation for the solar site. It also shows the ratio of total to extraterrestrial radiation as a percent. The temperature table gives the average, daytime, nighttime, maximum, and inlet-water temperature for the solar site. All of the passive and some of the active solar sites are equipped with wind sensors which provide information for two wind tables furnishing speed and direction. For some sites, a humidity table provides relative humidity values for the maximum and minimum humidity for each day. A technical discussion of the instruments and measurements used to obtain these data tables is included. (LEW)

23249 (SOLAR/0010—79/08) Environmental data for sites in the National Solar Data Network. (International Business Machines Corp., Huntsville, AL (USA)). Aug 1979. Contract AC01-77CS34049. 182p. NTIS, PC A04/MF A01. Order Number DE83008832.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted.

Environmental information collected at the sites of the National Solar Data Network is presented in the form of tables for each solar site. The sites are grouped into 12 zones, each of which consists of several adjacent states. The insolation table presents the total, diffuse, direct, maximum, and extraterrestrial radiation for the solar site. It also shows the ratio of total to extraterrestrial radiation

as a percent. The temperature table gives the average, daytime, nighttime, maximum, minimum and inlet-water temperatures for the solar site. All of the passive and some of the active solar sites are equipped with wind sensors which provide information for two wind tables furnishing wind speed and direction. For some sites, a humidity table provides relative humidity values for each day. A technical discussion of the instruments and measurements used to obtain these data tables is included. (LEW)

23250 **(SOLAR/0010—79/10) Environmental data for sites in the National Solar Data Network.** (International Business Machines Corp., Huntsville, AL (USA)). Oct 1979. Contract AC01-77CS34049. 181p. NTIS, PC A09/MF A01. Order Number DE83008847.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Environmental information collected at the sites of the National Solar Data Network is presented in the form of tables for each solar site. The sites are grouped into 12 zones, each of which consists of several adjacent states. The insolation table presents the total, diffuse, direct, maximum, extraterrestrial radiation for the solar site. It also shows the ratio of total to extraterrestrial radiation as a percent. The temperature table gives the average, daytime, nighttime, maximum, minimum, and inlet-water temperatures for the solar site. All of the passive and some of the active solar sites are equipped with wind sensors which provide and some of the active solar sites are equipped with wind sensors which provide information for two wind tables furnishing speed and direction. For some sites, a humidity table provides relative humidity values for the maximum and minimum humidity for each day. A technical discussion of the instruments and measurements used to obtain these data tables is included. (LEW)

23251 **(SOLAR/0010—79/11) Environmental data for sites in the National Solar Data Network.** (International Business Machines Corp., Huntsville, AL (USA). Federal Systems Div.). Nov 1979. Contract AC01-77CS34049. 166p. NTIS, PC A08/MF A01. Order Number DE83008833.

Environmental information collected at the sites of the National Solar Data Network is presented in the form of tables for each solar site. The sites are grouped into 12 zones, each of which consists of several adjacent states. The insolation table presents the total, diffuse, direct, maximum, and extraterrestrial radiation for the solar site. It also shows the ratio of total to extraterrestrial radiation as a percent. The temperature table gives the average, daytime, nighttime, maximum, minimum and inlet-water temperatures for the solar site. All of the passive and some of the active solar sites are equipped with wind sensors which provide information for two wind tables furnishing speed and direction. For some sites, a humidity table provides relative humidity values for the maximum and minimum humidity for each day. A technical discussion of the instruments and measurements used to obtain these data tables is included. (LEW)

1403 Economics

REFER ALSO TO CITATION(S) 23307

23252 **(AD-A—121252/1) Renewable energy system feasibility study. Final report 2 Sep 80-30 Apr 82.** Klett, D.E.; Goswami, D.Y.; Olson, D.E.; Stefanakos, E.K. (North Carolina Agricultural and Technical State Univ., Greensboro (USA). School of Engineering). Aug 1982. 102p. NTIS, PC A06/MF A01.

A study was performed to determine the economic feasibility of displacing a portion of the electrical energy usage at the Wind tunnel Complex at WPAFB by a renewable energy system. Wind systems, photovoltaic systems and solar thermal systems evaluated using lifecycle cost analysis. Economic feasibility was not found for any of the systems evaluated.

23253 **(SAND—83-8202) Economies of scale in the production of steam with solar thermal-fossil boiler hybrid systems.** Hansen, F.R.; Lindner, D.L.; Vitko, J. Jr. (Sandia National Labs., Livermore, CA (USA)). Mar 1983. Contract AC04-76DP00789. 99p. NTIS, PC A05/MF A01. Order Number DE83009359.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Levelized energy costs for steam plants in the size range 15 MM Btu/h to 400 MM Btu/h have been estimated for steam produced by several different technologies, including stand-alone oil and coal-burning plants as well as solar central receiver - fossil boiler hybrid plants. Models for the costs of plant subsystems used in these calculations are presented and discussed. Designs of the solar-fossil hybrids examined were optimized with respect to solar fraction and amount of thermal storage used by simulation of plant operation. The resulting levelized energy costs and their sensitivity to various modelling parameters are presented and discussed.

1404 Environmental, Legal, And Institutional Aspects

REFER ALSO TO CITATION(S) 23277

23254 **(DOE/IG—109) Performance accountability in the biomass energy systems program.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 10 Jun 1980. 28p. TIC. Order Number DE83006130.

Report to the Secretary, Deputy Secretary.

Investigators concluded that there are deficiencies in the manner in which the Biomass Energy-Systems Program and certain of its component projects are held accountable for satisfactory performance. On visiting four projects, IG found two instances where it was felt the contractors did not perform all the work required by the contract. In one of the instances, the DOE program manager was relieved of all responsibility regarding the project shortly after he recommended that the contractor's final report be rejected. The responsibility for the project was then assigned to the Solar Energy Research Institute (SERI), and nothing futher was done regarding the shortcomings of the contractor's report identified by the program manager. In another case, work that had been proposed by SERI for FY 1979 and that had been approved and funded by DOE, actually was not done even though SERI failed to obtain approval from appropriate DOE program personnel before deciding not to do the work. The contracts reporting requirements were not met for three of the projects. Recommendations are given.

1405 Solar Energy Conversion

REFER ALSO TO CITATION(S) 23207, 23208, 23209, 23210, 23211, 23222, 23226, 23227, 23238, 23239, 23864, 23871, 23873, 23874, 23876, 24006, 24153

23255 **(AD-A—121318/0) Solar thermochemical energy conversion and transport. Final report 15 Mar 77-30 Sep 82.** McCrary, J.H.; McCrary, G.E. (New Mexico State Univ., Las Cruces (USA). Physical Science Lab.). 10 Nov 1982. 40p. NTIS, PC A03/MF A01.

The high temperature catalytic dissociation of SO_3 and the CO_2-CH_4 reforming-methanation cycle are important chemical processes being considered in the development and application of solar-thermal energy conversion, transport, and storage systems. Separate facilities for evaluating chemical converter-heat exchangers at temperatures to 1000 C with high flow rates of SO_3 and of mixtures of CO_2 and CH_4 feedstocks have been assembled and operated on the NMSU campus. A number of receiver elements (chemical reactors) have been tested in these laboratory facilities in an effort to optimize catalyst parameters and catalyst reactor configurations. These tests led to the design and fabrication of both low power and high power solar energy receivers which were operated successfully at the White Sands Solar Furnace. Energy delivery methanation reactor design and parametric studies led to the fabrication and operation of laboratory closed-loop, energy conversion, transport, and delivery system. These latter experiments met with limited but promising success. Carbon deposition, though a

problem, is believed to be controllable with the optimization of catalyst parameters and feedstock composition.

23256 **(ANL/CNSV—36) Analysis of short-rotation forests using the Argonne model for selecting economic strategy (MOSES).** Vyas, A.D.; Shen, S. (Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 54p. NTIS, PC A04/MF A01. Order Number DE83008717.

The use of the Argonne Model for Selecting Economic Strategy (MOSES) for short-rotation forestry is demonstrated in this report. The model, which employs a complementarity algorithm for optimization, has a valuable capability to select the most economical harvesting cycle given data on biomass production costs, financial parameters, and the management system for a short-rotation forest. Argonne's economic analysis method for short-rotation forestry, of which MOSES is the central component, is outlined briefly. The model's output, combined with independent analysis of the effect of tree spacing on production costs and woody biomass yield, allows specification of least-cost production systems for short-rotation forestry. The results of analyses of three hypothetical forestry plantations are summarized here. These results, while obtained for species and growing conditions, support three general conclusions regarding short-rotation forestry. For conventional straight-row planting of trees at a 4 x 4 ft spacing, forage harvesting is more economical than whole-tree harvesting. Production costs for this planting strategy can be further reduced through use of an innovative circular saw harvester on which research is now being conducted. Short-rotation forestry costs can be minimized, however, by adopting a planting approach in which seedling cuttings are sown randomly and very densely and year-old saplings are forage harvested.

23257 **(ANL/EES-TM—208) Physical engineering and environmental aspects of ocean kelp farming. Final report, January 1982-September 1982.** Wang, D.P.; Ditmars, J.D. (Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 91p. (GRI—81/0111). NTIS, PC A05/MF A01. Order Number DE83008640.

Some of the key areas in which knowledge is required for the conceptual design of nearshore kelp farms were investigated. The topics considered include: interactions between ocean currents and kelp farms, nutrient distribution and transport, wave-farm interactions, implications of wave-field modifications, and wave forces on kelp plants. A separate abstract was prepared for one paper. (MHR)

23258 (ANL/EES-TM—208, pp 23-87) **Appendix: ocean engineering aspects of coastal kelp farming.** Dalrymple, R.A.; Hwang, P.A.; Perlin, M. (Coastal and Offshore Engineering and Research, Inc., Newark, DE). Oct 1982. NTIS, PC A05/MF A01. Order Number DE83008640.

In Physical engineering and environmental aspects of ocean kelp farming. Final report, January 1982-September 1982.

Analyses of the following problems are described: wave modification in and around the kelp farm, shoreline modification, wave force analysis, and sedimentation and scour due to the kelp farm. Included in appendices are: wave height reduction due to kelp, parabolic method for combined refraction/diffraction of water waves, and modeling of sediment transport in the nearshore. (MHR)

23259 **(BMFT-FB-T—79-94) Test stations for flat plate collectors for Iran, Brazil and India.** Scharmer, K.; Kleinhans, U. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 15p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750319.

Portions are illegible in microfiche products.

A solar collector test facility was developed to evaluate the characteristics of flat plate collectors. In the frame of the project three collector test facilities were bought in order to send them to research institutes in Iran, Brazil and India. With these test facilities it will be possible to determine the characteristics of collector developments of those countries and to get tested German collectors under the climatic conditions of the three countries.

23260 **(CEA-CONF—6298) Solar biotechnology: microalgae production in tubular photoreactors for energy and chemicals.** Gudin, C. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). May 1982. 6p. (CONF-8205168—1-Summ.). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83770042.

From 6. coordination meeting; Brussels, Belgium (6 May 1982).

Portions are illegible in microfiche products; Published in summary form only.

23261 **(CEA-CONF—6419) Small angle neutron scattering study of structural heterogeneities in -Si:H.** Bellissent, R.; Chenevas-Paule, A.; Roth, M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jul 1982. 11p. (CONF-820775—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83770040.

From Conference of the Society of Glass Technology; Cambridge, UK (12 Jul 1982).

Some recent structural studies suggest that -Si:H has not an homogeneous structure. S.A.N.S. provides us with a very efficient method to study the intermediate range order and the hydrogen repartition. The very different scattering lengths for thermal neutrons of H and D lead to very different scattered intensities versus isotopic concentration. From experiments carried out on pure, hydrogenated and deuterated amorphous silicon samples obtained by sputtering, we have put into light an hydrogen sensitive small angle neutron scattering. The presence of a ring located at 0.22 A} should be related to a mean correlation length of about 30 A.

23262 **(CEA-CONF—6425) Kinetic aspects of the n-GaAs/(S/Se)sub(n)sup(2-) photoelectrochemical cell.** Bourrasse, A.; Cachet, H.; Horowitz, G. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Aug 1982. 6p. (CONF-8208106—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83770041.

From 4. international conference on photochemical conversion and storage of solar energy; Jerusalem, Israel (8 Aug 1982).

Portions are illegible in microfiche products.

The most efficient photoelectrochemical solar cell today is the n-GaAs/selenide-polyselenide cell with 12% solar efficiency. However long term experiments seem to indicate a slow corrosion of the photoanode. Some results are presented that show the purely kinetic stabilization mechanism of the n-GaAs electrode, and could explain its long term corrosion.

23263 **(CONF-800814—34) Chemical feedstocks from wood: aqueous organic alcohol treatment.** Hansen, S.M.; April, G.C. (Alabama Univ., University (USA). Dept. of Chemical and Metallurgical Engineering). 1980. 8p. NTIS, PC A02. Order Number DE81903609.

From 180. American Chemical Society meeting/2. chemical congress of the North American Continent; Las Vegas, NV, USA (24 Aug 1980).

Paper copy only, copy does not permit microfiche production.

Recent work on delignificantion of wood with aqueous organic solvents is reviewed. Emphasis on the rate of lignin removal and the extent of pulp recovery is included. The use of the data to make preliminary process calculations regarding technical and economic feasibility is also addressed with comparisons to recent work reported in the literature. (MHR)

23264 **(DOE/ER/04178—6) Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, September 15, 1981-November 29, 1982.** Wrighton, M.S. (Massachusetts Inst. of Tech., Cambridge (USA)). Nov 1982. Contract AC02-76ER04178. 7p. NTIS, PC A02/MF A01. Order Number DE83008747.

Developments are briefly reported in: p-type WS_2-based photoelectrochemical cells, photochemical chlorine generation, and a-Si:H photocathodes. The properties of the p-WS_2 are found to rival or surpass those of p-InP and to closely resemble p-WSe_2 with respect to efficiency in photochemical H_2 generation. By using very high concentrations of LiCl in aqueous solution it has been possible

to effect the visible light-assisted generation of Cl_2 at n-MY_2 photoanodes (M=Mo, W; Y=S, Se). Preliminary data indicate that photochemical generation of H_2 from the a-Si:H is more efficient than from single crystal p-Si, though a surface catalyst is required in both cases. (LEW)

23265 **(DOE/ET/20279—156) High-power I-V curve tracer employing a capacitive load.** Warner, T.H.; Cox, C.H. III. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). 1981. Contract AC02-76ET20279. 5p. (CONF-810748—3). NTIS, PC A02/MF A01. Order Number DE82000663.

From Commercial photovoltaics measurements workshop; Vail, CO, USA (27 Jul 1981).

Portions are illegible in microfiche products.

A portable, photovoltaic voltage versus current curve tracer is discussed. The curve tracer employs a capacitive load to provide automatic sweeping of the array voltage. The unit is capable of measuring arrays up to 10 kW, but is similar and lighter than a conventional 2.5-kW dissipative load.

23266 **(DOE/JPL/955282—80/7) LSA large area silicon sheet task enhanced I.D. slicing. Quarterly report No. 7, July-September 1980.** Walters, D. (Siltec Corp., Menlo Park, CA (USA)). Oct 1980. Contract NAS-7-100-955282. 35p. NTIS, PC A03/MF A01. Order Number DE83009260.

Portions are illegible in microfiche products.

The purpose of this program is to develop and demonstrate enhanced I.D. slicing that will significantly increase the number of usable slices per inch of ingot over industry practice. This process requires a reduction in both blade and slice thickness and will be achieved through a combination of three key elements of slicing technology: ingot rotation with minimum exposed blade area, dynamic cutting edge control, and the use of prefabricated insert blades. Demonstration runs continued on schedule this quarter. All runs utilized the principle of ingot rotation, with the incorporation of the cutting edge position control mechanism for precision slicing. In the interest of developing a more efficient and economical blade, Beryllium Copper blades were evaluated. Concurrently, efforts toward developing a functional wafer retrieval system continued. In order to improve wafer quality, the saw head was converted to a larger 16 5/8-inch size demonstrating notable improvement.

23267 **(DOE/JPL/955843—83/8) Large-area sheet task: advanced dendritic-web-growth development. Annual report, October 23, 1981-October 22, 1982.** Duncan, C.S.; Seidensticker, R.G.; McHugh, J.P.; Schruben, J. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center). 18 Jan 1983. Contract NAS-7-100-955843. 81p. NTIS, PC A05/MF A01. Order Number DE83008871.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Substantial progress has been made in the reduction of thermally generated stresses in the growing web crystal. These stresses, which if too high cause the ribbon to degenerate, have been reduced by a factor of three, resulting in the demonstrated growth of high-quality web crystals to widths of 5.4 cm. This progress has been brought about chiefly by the application of thermal models to the development of low-stress growth configurations. A new temperature model was developed which can analyze the thermal effects of much more complex lid and top shield configurations than was possible with the old lumped shield model. Growth experiments which supplied input data such as actual shield temperature and melt levels were used to verify the modeling results. Desirable modifications in the melt level-sensing circuitry were made in the new experimental web growth furnace, and this furnace has been used to carry out growth experiments under steady-state conditions. New growth configurations were tested in long growth runs which produced wider, lower stress and higher quality web crystals than designs previously used.

23268 **(DOE/JPL/955902—82/7) Module experimental process system development unit (MEPSDU). Summary technical report, November 26, 1980-February 23, 1982.** Wohlgemuth, J.H. (Solarex Corp., Rockville, MD (USA)). 1982. Contract NAS-7-100-955902. 140p. NTIS, PC A07/MF A01. Order Number DE83008995.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The purpose of the program reported was to demonstrate the technical readiness of a cost-effective process sequence for the fabrication of flat-plate photovoltaic modules. The initial plan was to design, develop, fabricate and operate a Module Experimental Process System Development Unit (MEPSDU). Due to DOE budget cutbacks and change in emphasis of their programs the MEPSDU program was discontinued before completion. The technical accomplishments at the time the program was discontinued are summarized. These are: identification of a cost effective process sequence; laboratory verification of the cell process sequence; design of the equipment required for the cell process sequence; and performance of an IPEG cost analysis of the process sequence. This process sequence was based on four significant program developments: Hot Spray TiO/sub x/ AR Coating; Glass Bead Back Clean-Up; Wave-Soldering for Front Contacts; and Ion Milling for Edging. The preliminary cost analysis indicated that the 6.6 MW pilot line of this contract could achieve a cell add-on cost of $0.56 per peak watt. The selling cost of the cells from a full scale 50 MW line would be consistent with the DOE module cost goal of $0.70 per peak watt.

23269 **(DOE/JPL/955909—83/9) Low-Cost Solar-Array Project: cell and module formation research area. Process research of non-CZ silicon material. Quarterly report No. 4, December 1, 1982-February 28, 1983.** (Westinghouse Electric Corp., Pittsburgh, PA (USA). Advanced Energy Systems Div.). 1983. Contract NAS-7-100-955909. 33p. NTIS, PC A03/MF A01. Order Number DE83008998.

Technical work reported emphasized investigations for liquid diffusion masks and liquid dopants to replace the more expensive CVD SiO_2 mask and gaseous diffusion processes. The latter were specified in the Westinghouse baseline process sequence for producing solar cells from dendritic web silicon. In addition to the liquid dopant studies, silicon pellets have been prepared in the silicon shot tower; and solar cells have been fabricated using web grown where the pellets were used as a replenishment material. A number of verification runs were made using the boron dopant and liquid diffusion mask materials. Experiments were carried out to determine the relationship of sheet resistivity, temperature, gas flows, and gas composition for the diffusion of the liquid phosphorus solution. The liquid was applied using the squeegee applicator. Cells produced had a wide range of efficiencies, mainly due to problems in application of the liquid diffusant. These problems should be alleviated with the use of the meniscus coater.

23270 **(DOE/NBM—1059) Thermochemical conversion of biomass to synthetic fuels in a large experimental facility. Gasification Research on Wood (GROW) Project, April 1981-March 1982.** Flanigan, V.J.; Findley, M.E.; Sineath, H.H. (Missouri Univ., Rolla (USA)). 1982. Contract AC06-76RL01830. 304p. NTIS, PC A14/MF A01. Order Number DE83008355.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A description of the Phase II segment of the GROW project is presented. In Phase II, operational experimentation of the 40-inch diameter, fluidized bed reactor at the University of Missouri-Rolla was continued. Recycle gas and catalyst and carbon dioxide scrubbing were used in an attempt to improve the quality of the gas. A description of the operation and the results of the tests with wood feed material and the conclusions drawn from the results are discussed. In general, recycling produced little improvement over air-blown gasification. The low temperatures caused by the heat consumption of the recycle gas and dilution of the oxygen appeared to be responsible. Both of these effects required a greater amount of air to maintain a given reactor temperature. With few exceptions, use of recycle gas in the operation of the reactor was adequate and safe. The effect of stripping carbon dioxide from the recycle gas was what was anticipated. The hydrogen content of the gas increased, and the carbon monoxide content decreased when recycle gas was used. Greater changes in the hydrogen and carbon monoxide occurred when potassium carbonate and a wood ash catalyst were used. However, use of the catalyst tended to cause fusing of the bed.

23271 (EUR—7018-FR) Production of cereal straw and corn stalks for energy purposes. Photosynthetic production of organic matter. (Institut National de Recherches Agronomiques (INRA), 75 - Paris (France)). 1981. 84p. (In French). European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037. Order Number DE82902722.

A study is made of potential agricultural energy sources in France, the effect of agricultural techniques and genetics on the production of cereals, soil conservation, energy benefits from straw recovery, and an economic gauge model for straw recovery. Cereal production maps of France are also illustrated. 46 references.

23272 (PB—83-133116) Energy from marine biomass: methane production by mariculture on land. Final report. Wagener, K. (Commission of the European Communities, Luxembourg). [nd]. 71p. NTIS, PC E04/MF E04.

A system for biofuel farming in arid coastal areas is at present under investigation in a cooperative European project. The biomass production is based on seawater which is pumped through shallow artificial ponds. Due to the high productivity of phytoplankton, easy fermentation to methane, and complete mineral nutrients recycling, the net energy balance (output/input) is expected to be 14 for methane and 7 for methanol, respectively. Since no fertile land or fresh water is needed, there is no competition with food production on arable land. Such a system is entirely self-contained energy-wise, which makes it attractive for remote desert areas and developing countries.

23273 (PB—83-133165) Photochemical, photoelectrochemical and photobiological conversion. Final report. Gerischer, H. (Commission of the European Communities, Luxembourg). [nd]. 58p. (EUR—7556-EN). NTIS, PC E04/MF E04.

The efficiency of energy conversion in photoelectrochemical cells, formed of semiconductor/electrolyte junctions, is known to be adversely affected by the tendency of the electrode to photodecompose, and this has been a major subject of international research. The thermodynamic and kinetic mechanisms of the decomposition reactions were studied by observing photocurrent spectra and time transients, obtained with the aid of CdS photoanodes in polychalcogenide redox systems. Their use in regenerative cells and fuel-type cells is suggested.

23274 (PB—83-133405) Energy recovery by gasification of agricultural and forestry wastes in a co-current moving bed reactor. Final report. (Commission of the European Communities, Luxembourg). [nd]. 125p. NTIS, PC E06/MF E06.

Pilot plants with capacities of 4, 13 and 50 kg/h of biomass have been erected to obtain design rules and mass and energy balances for various biomass fuels. A complete physical model has been made of the process to predict internal processes such as the influence of solids properties (particle size, fusion of ash, temperature profiles, conversion profiles, gas and solids flow, etc.) on reactor performance.

23275 (PB—83-133413) Conversion and chemical storage of solar energy in a photoelectrochemical cell. Final report. Lepoutre, G.; Richoux, M.C.; De Backer, M. (Commission of the European Communities, Luxembourg). [nd]. 67p. (EUR—7608-EN). NTIS, PC E04/MF E04.

Principles of a photoelectrochemical cell are described based on the photodissociation of water into hydrogen and oxygen to convert and store solar energy. Further work is needed on the choice of dye and electrode material to optimise the rate of hydrogen production. A reprint of 'Photoelectrochemical hydrogen production using dyes in visible light' is annexed to the report.

23276 (PB—83-133868) Recherche d'une biotechnologie solaire basee sur la culture continue de cellules photosynthetiques (Research on a solar biotechnology based on the continuous culture in photosynthetic cells). Final report. Gudin, C.; Chaumont, D.; Desanti, O.; Pioline, D. (Commission of the European Communities, Luxembourg). [nd]. 24p. NTIS, PC E03/MF E03.

The use of microalgae in the production of energy from biomass is envisaged for particular cases. Biomass obtained from effluent purification systems is considered to be a suitable source. For the purposes of this study, a glass or plastic-material closed system has been used for the culture cell. The characteristics of the principal species cultivated by heliosynthesis have been determined, and the energy distribution and economic perspectives for this system have been established. Prospects for the development of solar biotechnology in the years 1980--1983 are outlined.

23277 (PB—83-137380) Photovoltaic energy systems: environmental concerns and control technology needs. Moskowitz, P.D.; Perry, P.; Wilenitz, I. (Brookhaven National Lab., Upton, NY (USA)). Nov 1982. 71p. NTIS, PC A04/MF A01.

Technical and commercial readiness for alternate photovoltaic energy systems, and waste streams from three different photovoltaic systems are examined. This analysis suggests that some uncontrolled waste streams could be declared toxic or hazardous under various provisions of the Clean Air, Clean Water, and Resource and Conservation Recovery Acts. Although some processes could emit large quantities of pollutants, these can be controlled using available technology. Other processes may emit small quantities of more toxic pollutants which will probably not be directly controlled unless significant health hazards are identified. Environmental problems in installation and operation are probably associated with large central-station applications; no significant effects are expected from small decentralized applications. Decommissioning of broken or degraded photovoltaic systems will generate large quantities of solid waste which can be simply disposed of in a landfill or perhaps recycled.

23278 (PB—83-138909) Studie kring maetning av traedrester vid Nydo Energi i hissmofors (a study of measuring wood residues at nydo energy ltd.). Fryk, H. (Sveriges Lantbruksuniversitet, Uppsala. Institutionen foer Virkeslaera). 1982. 34p. NTIS, PC A03/MF A01.

The aim of the investigation was to compare the current methods used for evaluating the energy value in logging wastes.

23279 (PNL-SA—10933) Hydrodeoxygenation of phenolic components of wood-derived oil. Elliott, D.C. (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 19p. (CONF-830303—10). NTIS, PC A02/MF A01. Order Number DE83007687.

From 185. American Chemical Society national meeting; Seattle, WA, USA (20 Mar 1983).

Catalytic hydrotreating of the product of biomass liquefaction is discussed. Batch reactor experiments to perform catalyst screening tests with phenol are reported. Hydrotreatment of several wood-derived oil products was undertaken in the presence of nickel and cobalt-molybdenum catalysts. (MHR)

23280 (SERI/PR—9079-1-T6) Structural and electronic studies of defects in amorphous silicon. Report No. 3. Technical progress report, November 1981-January 1982. Street, R.A. (Xerox Palo Alto Research Center, CA (USA)). 15 Mar 1982. Contract AC02-77CH00178. 29p. NTIS, PC A03/MF A01. Order Number DE82009312.

Portions are illegible in microfiche products.

p-i-n amorphous silicon solar cells have been fabricated. The effect of alloying with carbon for the p-layer has been studied. The short circuit current is observed to increase, but a lower open circuit voltage and fill factor result in no net improvement in efficiency. The degradation of the cells with prolonged illumination is also studied. Solid state reactions at the interface between thin films of Au and hydrogenated amorphous Si are probed by interference enhanced Raman scattering, TEM, scanning Auger microprobe, and Schottky electrical measurements. It is found that crystalline Si islands with a dimension of ~ 1 μm grow dendritically after annealing to temperatures above 150°C. The islands apparently grow laterally due to diffusion of Si through Au. A model is proposed to describe the formation process, which includes the low temperature Si diffusion into Au to form a Au-Si intermixed phase, and the agglomeration of the Au-rich regions.

23281 (SERI/TR—215-1598) Extensive modeled terrestrial solar spectral data sets with solar-cell analysis. Bird, R.E.; Hulstrom, R.L. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 41p. NTIS, PC A03/MF A01. Order Number DE83008478.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

By use of the BRITE radiative transfer code, 31 new spectra have been generated and are presented in tabular and graphical form. These spectra used the revised extraterrestrial spectrum of Neckel and Labs, an improved Rayleigh scattering calculation, and other minor improvements. The spectra include direct normal, global normal, and global horizontal irradiance for several air mass values and for turbidities of 0.1 and 0.27 at 0.5-μm wavelength. Several of these spectra were used with spectral response curves from Si, CdS/Cu_2S, GaAs, and α-Si to determine the effects of air mass and turbidity on direct normal and global normal primary reference cell measurement procedures. Results from these solar cell analyses are presented.

23282 New sources for fuel and materials. Calvin, M. (Lawrence Berkeley Lab., CA). *Science (Washington, D.C.);* **219**: 24-26(7 Jan 1983). Contract AC03-76SF00098.

From Biomass substitutes for liquid fuels; Campinas, Brazil (9 Feb 1982).

A selection of new plant sources with high potential for production of chemicals and liquid fuels is reviewed. Some productivity data are given, and suggestions are made for modification of both the product character and the productivity of the plants. 4 figures

23283 Electron-transfer reactions of chlorophyll a and porphyrin triplets with radicals in aqueous micellar solutions. Levanon, H.; Neta, P. (Univ. of Notre Dame, IN). *Journal of Physical Chemistry;* **86**: No. 23, 4532-4537(11 Nov 1982).

The reactivity of the photoexcited triplet states of chlorophyll a (Chla), ZnTPP, and MgTPP (P/sup T/) with radicals was studied in neutral micelles by pulse radiolysis and photolysis (PRAP) spectroscopy. Steady-state triplet concentration was produced by a 2-ms light pulse, and the system was then subjected to a 10-ns electron pulse to form the radicals $(CH_3)_2COH$, $Br_2^{\cdot-}$ and $MV^{+\cdot}$ from the proper solutes. The triplet states were found to undergo one-electron reduction by $(CH_3)_2COH$ and oxidation by $Br_2^{\cdot-}$ with second-order rate constants approaching the diffusion-controlled limit and significantly more rapidly than the reactions of the ground states. The reaction of the triplet states (P/sup T/) with $MV^{+\cdot}$ radicals was found to result in an overall recovery of the ground-state P from P/sup T/. The mechanism of this process is discussed in terms of two steps of electron transfer. P/sup T/ + $MV^{+\cdot} \rightarrow P^{\cdot-} + MV^{2+} \rightarrow P + MV^{+\cdot}$.

23284 Effects of ion beam hydrogenation on silicon solar cell structures. Sharp, D.J.; Panitz, J.K.G.; Seager, C.H. (Sandia National Labs., Albuquerque, NM (USA)). *Thin Solid Films;* **95**: No. 4, 369-375(24 Sep 1982).

From International conference on metallurgical coatings and process technology; San Diego, CA (USA) (5 - 8 Apr 1982).

A Kaufman ion source was used to hydrogenate polycrystalline silicon structures at energies from 250 to 5000 eV. This results in improvements in photovoltaic properties and in shorter hydrogenation times than have been reported by other groups using arc or plasma discharges. Single-crystal silicon samples exposed to similar hydrogenation conditions were evaluated using scanning electron microscopy. IR spectroscopy, reflectometry and ellipsometry. The thickness and other characteristics of this modified surface region vary as a function of the ion energy and the dose rate. The properties of this surface region may influence the choice of subsequent antireflective coatings that are used to provide optimum performance of these devices.

23285 Electrochemical photovoltaic cells based on n-GaAs and the triiodide/iodide redox couple in acetonitrile. Langmuir, M.E.; Parker, M.A.; Rauh, R.D. (EIC Lab Inc, Newton, MA, USA). *Journal of the Electrochemical Society;* **129**: No. 8, 1705-1710(Aug 1982).

The electrochemical photovoltaic cell (EPC) based on n-GaAs and a CH/sub 3/CN, I/sub 3//sup -//I/sup -/ redox electrolyte was evaluated. Greater than 1MI/sup -/ was necessary to avoid concentration polarization at the photoanode above moderate illumination intensities. The charge separation at the illuminated n-GaAs/electrolyte interface was enhanced by adsorption of Se/sup ?/ and Ru/sup +3/ or by complexing polymers such as polyvinyl pyrrolidone. In practical cells, a compromise is necessary between light absorption by I/sub 3//sup -/, and having sufficient I/sub 3// sup -/ to depolarize the counterelectrode. Best "solar cell" efficiency in the quiescent electrolyte under 53 mW/cm/sup 2/ irradiation was about 3.4% with V/sub oc/?0.60,i/sub sc/?9 mA/cm/sup 2/, and fill factor 0.34 with no corrections for solution absorbance or cell reflectance. 16 refs.

23286 Photoelectrochemical behavior of n-Si electrodes protected with Pt-polypyrrole. Skotheim, T.; Petersson, L.G.; Inganas, O.; Lundstrom, I. (Linkoping Inst of Technol, Swed). *Journal of the Electrochemical Society;* **129**: No. 8, 1737-1741(Aug 1982).

Highly stable photoanodes based on single crystal n-Si protected with a thin coating of Pt and electrochemically grown polypyrrole films have been studied. A power conversion efficiency of 5.5% under illumination of 55 mW/cm/sup 2/ tungsten-halogen light is reported with an iodide/triiodide electrolyte. The cells exhibit long-term stability over a time period of weeks. The operating characteristics of the junctions yield high fill factors and rapid electron transfer kinetics at the interface. Values of the junction quality factor as low as 1.1 have been achieved showing almost ideal Schottky junction behavior. The open-circuit voltage as a function of the redox potential of the electrolyte shows substantial Fermi level pinning at the interface. The physical structure of the junctions has been studied with AES sputter profiling techniques. The main factor limiting the power conversion efficiency of the present devices is low short-circuit photocurrent due to light absorption in the concentrated iodide/triiodide electrolyte. 11 refs.

23287 Thermovoltaic power source. Severns, J.G. US Patent Application 6-403,838. 30 Jun 1982. 36p.

A thermophotovoltaic power source comprises a Cassegrain solar collector and concentrator, a thermal vessel including a containment vessel holding thermal storage material therein, the containment vessel having the shape of an annulus closed at one end and disposed with its open end in registry with an aperture in the thermal vessel, with a selective band radiating layer coating the internal surface of the annulus cavity, and further including an external array of photovoltaic cells mounted on a cooled cylinder disposed for insertion by a positioning motor to a desired depth into the annulus cavity and thus into adjacency with the selective band radiating layer. Concentrated solar energy is applied by the solar collector through a second aperture into the thermal vessel to heat the thermal storage material in the containment vessel and thereby cause the selective radiating layer to radiate energy to excite a current in the photovoltaic array. Constant current control and/or load-matching are obtained by varying the degree of insertion of the photovoltaic array into the thermal storage annular cavity.

23288 Effect of lithium diffusion into polycrystalline Si solar cells. Young, R.T.; Jellison, G.E. Jr.; Chang, Y.K.; Lu, M.C.; van der Leeden, G.A. (Oak Ridge National Lab., TN). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1316-1321(Jun 1981). Contract W-7405-ENG-26.

An effort has been made to understand the role of lithium in polycrystalline Si. It was found recently that when Li was added to polycrystalline Si, it not only provided an excess free carrier for each ionized Li^+, but also dramatically improved the carrier mobility. The electrical transport properties of the individual grain boundaries before and after lithium diffusion have now been studied by temperature dependent resistivity measurements, which indicate that the grain boundary barrier heights can be effectively removed by lithium diffusion. However, the use of scanning laser techniques to study the influence of lithium on minority carrier recombination in the grain boundaries reveal that the recombination in most grain boundaries is not affected by lithium. This finding explains why the diffusion of lithium in polycrystalline Si solar cells does not give pronounced improvement in cell efficiencies.

23289 **Refeeding biogas digester solids.** Licht, L.A. (CH2M Hill Inc, Corvallis, OR, USA). *ASAE (American Society of Agricultural Engineers) Technical Paper;* No. 81-4539, 1-10(1981). (CONF-811221—).

From American Society of Agricultural Engineers meeting; Chicago, IL, USA (15 Dec 1981).

Biosolid, the digester residue from a biogas plant, must be of economical use to ensure the financial feasibility of biogas facilities. This paper sumarizes work performed for a Department of Energy study in the Imperial Valley of California. Feeding trials show that biosolid can only be used as a small proportion of feed rations. Apart from bacterial debris, biosolid is composed larely of non-nutritive residues. 5 refs.

1406 Photovoltaic Power Systems

REFER ALSO TO CITATION(S) 23252

23290 **(AD-A—120814/9) Flat plate photovoltaic power systems: description, design and cost. Summary report.** Hall, M.R.; Smith, G.D.; Holmes, D.L. (Naval Weapons Center, China Lake, CA (USA)). Jul 1982. 121p. NTIS, PC A06/MF A01.

The Energy Program Office at the Naval Weapons Center has been tasked to manage the Department of the Navy's photovoltaic effort. This effort includes participation in the Federal Photovoltaic Utilization Program (FPUP), which is sponsored by the Department of Energy, and encouragement of worldwide Navy activities to use Navy funds to procure cost-effective photovoltaic power systems. This report describes in simple nontechnical terms what photovoltaic power systems are, how they are sized, their costs, and their advantages and disadvantages. It also includes all tables and information necessary for the nontechnical person to determine preliminary sizes and costs of photovoltaic power systems for most applications. Navy activities can identify cost-effective applications for photovoltaic power systems by using this report and can procure the systems on their own or seek assistance from the Energy Program Office. The Energy Program Office will assist in preparing procurement specifications, evaluating proposals, awarding and monitoring contracts, and acceptance-testing the systems.

23291 **(DOE/ET/20279—236) Westinghouse final report: design and fabrication of a prototype system for photovoltaic residences in the Southwest.** Pittman, P.F.; Dressler, R.T. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). Dec 1982. Contract AC02-76ET20279. 104p. NTIS, PC A06/MF A01. Order Number DE83008720.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A single-family residence including a solar photovoltaic (PV) power system was designed for the Southwest. The residence utilizes passive solar and energy-conservation techniques to minimize the annual electrical load. A Prototype of the electrical system was constructed at the Southwest Residential Experiment Station in Las Cruces, New Mexico, and maintained for one year. The array is integrally mounted using a new panel installation concept and produces 5.7-kilowatts peak at standard test conditions (100 milliwatts per square centimeter, 28-degrees Celsius, with an air mass of 1.5). The system is interactive with the utility and uses a voltage-fed, self-commutated power conditioner. The system operates automatically, turning on and off as the sun rises and sets.

23292 **(EPRI-AP—2475) Photovoltaic requirements estimation - a simplified method. Final report.** Doane, J.W.; Gresham, J.B. (Science Applications, Inc., Golden, CO (USA)). Feb 1983. 133p. NTIS, PC A07/MF A01. Order Number DE83901864.

A simplified, single-year analysis method is presented for evaluating the economics of photovoltaic (PV) systems for central station applications. This method, which includes simplified utility production cost and PV system performance models, was developed and implemented on a desktop microcomputer. The approach and resulting model are adaptable to evaluating other time-varying generation options where a primary source of value is fuel savings. Average daily performance profiles were developed for flat plate and concentrating PV systems at three sites: Miami, Florida; El Paso, Texas; and Albuquerque, New Mexico. Those profiles were matched against generation and demand data from three appropriate Regional Systems: Region SE, Region SC and Region W, respectively. The result was an estimate of fuel displacement, by fuel type, on an hour-by-hour basis over a one-year period. Finally, economic evaluation of the value of displaced fuels and variable operation and maintenance expenses resulted in a series of PV cost and performance tradeoffs for each combination of site and PV system type.

23293 **(SAND—81-7088/14) Intermediate photovoltaic system application experiment operational performance report. Volume 14. For Beverly High School, Beverly, Massachusetts for October 1982.** Baxter, H.H. Jr. (Boeing Computer Services Co., Seattle, WA (USA)). Feb 1983. Contract AC04-76DP00789. 31p. NTIS, PC A03/MF A01. Order Number DE83009177.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Presented are the data accumulated during October at the intermediate photovoltaic project at Beverly High School, Beverly, Massachusetts. Generated energy and environmental (weather) data are presented graphically. Explanations of irregularities not attributable to weather are provided.

23294 **(SAND—81-7088/15) Intermediate photovoltaic system application experiment operational performance report. Volume 15. For Beverly High School, Beverly, MA for November 1982.** (Boeing Computer Services Co., Seattle, WA (USA); Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 32p. NTIS, PC A03/MF A01. Order Number DE83009176.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Presented are the data accumulated during November at the intermediate photovoltaic project at Beverly High School, Beverly, Massachusetts. Generated energy and environmental (weather) data are presented graphically. Explanations of irregularities not attributable to weather are provided.

23295 **(SAND—81-7088/16) Intermediate photovoltaic system application experiment operational performance report. Volume 16. For Beverly High School, Beverly, MA for December 1982.** (Boeing Computer Services Co., Seattle, WA (USA)). Feb 1983. Contract AC04-76DP00789. 30p. NTIS, PC A03/MF A01. Order Number DE83009178.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Presented are the data accumulated during December at the intermediate photovoltaic project at Beverly High School, Beverly, Massachusetts. Generated energy and environmental (weather) data are presented graphically. Explanations of irregularities not attributable to weather are provided.

23296 **Experience with a grid-interactive solar photovoltaic electric system.** Kaplan, S.I. (Oak Ridge National Lab., TN); Benson, C.M. *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 90-91(Jun 1981). Contract W-7405-ENG-26.

Mississippi County (Arkansas) Community College receives a substantial portion of its electric power and space heating needs from a water/glycol-cooled, 240-kW (peak) solar photovoltaic array. The effects of solar equipment design configuration upon cell and collector performance, experience with coolant system interlocks, and preliminary results from systems checkout are discussed.

1407 Solar Thermal Power Systems

REFER ALSO TO CITATION(S) 23252, 23323, 23663

23297 (ANL/NESC—821) STESEP; solar total energy system evaluation. McFarland, B.L. (Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048821.

Only average days can be considered. Only superheated Rankine thermal cycles can be analyzed. Only sensible heat thermal storage systems can be included in the analysis. Transients due to cloud formations or startup/shutdown conditions cannot be analyzed. Variable inflation or escalation rates cannot be analyzed. Reference report, AI-78-18.

STESEP was developed to evaluate trade-offs related to cascading of thermal power conversion systems, determination of optimum collector sizes and operating conditions, and comparison of solar total energy concepts in various types of commercial buildings in different parts of the country. STESEP evaluates the operating Rankine cycle solar thermal total energy system and photovoltaic total energy system for commercial buildings using either a deterministic approximation of the local weather conditions or tape data from typical meteorological year (TMY) tapes developed by Sandia Laboratories, Albuquerque, from the SOLMET tapes of the National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Center, Asheville, North Carolina.CDC6600,7600;IBM370; FORTRAN IV; OS/370 (IBM370), SCOPE (CDC6600,7600); 94K bytes of memory (IBM370) and 31K (octal) words of memory (CDC6600).

23298 (BMFT-FB-T—79-139) 10 kW - solar power station and power plant optimizing. Gloel, J.; Obloch, H.; Thoel, P. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Jan 1979. 123p. (In German). NTIS (US Sales Only), MF A0106/MF A01. Order Number DE83750335.

Microfiche only, copy does not permit paper copy reproduction.

The following report describes development, production and test of a 10 kW prototype solar power station. Characteristics of the plant are: unpressurized hot water of 95°C for transport and storage of thermal energy. A screw expansion engine with freon R 114 is provided for the thermomechanical energy conversion. The AC-three phase generator is interconnected with a static converter to obtain technical voltages and frequencies. The maximum net power output is 10 kW.

23299 (CONF-8208116—1) Solar liquid-metal MHD performance predictions. Geyer, H.K.; Pierson, E.S. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007865.

From 20. symposium on the engineering aspects of MHD; Irvine, CA, USA (14 Aug 1982).

Portions are illegible in microfiche products.

Previous LMMHD (liquid-metal MHD) solar studies have demonstrated attractive performance based, in part, on component parameters characteristic of mature sytems. The present study concentrates on near-term applications, i.e., conservative component parameters and lower temperatures. Efficiencies are calculated for LMMHD Rankine cycles at 420 to 470 K, and LMMHD Brayton cycles at 700 to 810 K. The resulting efficiencies appear to be competitive with alternative energy-conversion concepts.

23300 (DFVLR-FB—82-27) Thermodynamic model for a central receiver of a solar plant with partial shading of the heliostat field. Reinkenhof, J. (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.)). 1982. 120p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750397.

With 60 figs., 2 tabs., 26 refs.

The time-dependent loss mechanisms of a heliostat field and a stochastic model for the simulation of partial shading of the heliostat field are discussed. The coupling of the heliostat field with the receiver is reduced to the problem of an aperture covered with directed energy sources and sinks. For the intensity distribution over the aperture a two-dimensional normal distribution has been selected. The density of the energy flow can be calculated for any point within the receiver. The local heat flux toward the walls of a receiver with arbitrary geometry is estimated. Especially the case of isothermal walls with re-emitted radiation escaping through the aperture is treated. A computer code CEREMO and numerical results are presented.

23301 (DOE/ET/20216—T2) Solar Total-Energy Project, Shenandoah, Georgia site. Annual technical progress report, July 1, 1980-June 30, 1982. (Georgia Power Co., Shenandoah (USA)). 1982. Contract FC04-77ET20216. 91p. (ALO—3994-83/1). NTIS, PC A05/MF A01. Order Number DE83009270.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A solar total energy system is used at a knitwear manufacturing facility to supply electric power to a utility grid and process steam and air conditioning to the facility. The system is a fully cascaded total energy system with parabolic dish solar collectors and steam Rankine cycle power conversion system capable of supplying 100 to 400 kW output with process steam extraction. A detailed chronological record of activities at the facility is presented. Progress is reported in the areas of site preparation and construction support, meteorology, and information dissemination/technology transfer. Cost summaries and future plans are also given. (LEW)

23302 (DOE/IG—118) Management of the ten-megawatt solar-thermal central-receiver pilot-plant project. (Department of Energy, Washington, DC (USA). Office of Inspector General). 20 Jun 1980. 37p. TIC. Order Number DE83006316.

Report to the Secretary, Deputy Secretary.

This report deals with inspection (between April and May 1979) of the Ten-Megawatt Solar-Thermal Central-Receiver Pilot-Plant Project being constructed in Barstow, California by the Department of Energy (DOE) and a utility consortium. At the time of inspection the project was behind schedule and over its projected cost. The project was subsequently rescheduled for initial operation by June 1982 at an estimated cost of $139.5 million. Recommendations are included relative to: better utilization of DOE resources; modified date for initial operation; and initiation of independent management audits. Comments to the draft report are appended. (PSB)

23303 (DOE/SF/11109—T15) Solar Pilot Plant Phase I, detailed design report: thermal storage subsystem research experiment. CDRL Item No. 8 (Approved). (Honeywell, Inc., Minneapolis, MN (USA). Systems and Research Center; Black and Veatch, Kansas City, MO (USA)). 17 Sep 1976. Contract AC03-76SF11109. 572p. NTIS, PC A24. Order Number DE82011800.

Paper copy only, copy does not permit microfiche production.

The Thermal Storage Subsystem Research Experiment is designed to give maximum information for evaluating the design, performance, and operating parameters of the Barstow Solar Pilot Plant. The experiment is summarized, and the experiment components detail design and integration are described. The experiment test and operation is described which is designed to collect engineering data to allow the design, performance, and operational characteristics to be specified for the Pilot Plant. Appended are: design documentation; pressure drop calculations; materials studies for thermal energy storage; flow charts for data acquisition and control; condenser detail design; instrumentation error analysis; logic diagrams for the control system; literature survey to evaluate the two-phase forced convection heat transfer; and the vaporizer performance model. (LEW)

23304 (MBB-UR—453/80-OE) Heliostat field layout for solar thermal power plants. Hartung; Kindermann; Mayer, W. (Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (Germany, F.R.)). Jun 1980. 15p. NTIS, PC A02/MF A01.

The calculation of the optimum distribution of heliostats, serving a solar tower collector for solar thermal power generation, is considered. A theoretical basis for the problem is posed, encompassing physical characteristics of the heliostats, their number, and intensity of the reflected radiation from each unit in function of

their layout. Theoretical results lead to numerical procedures (program package FAUST). Various heliostat field configurations (project EURELIOS and GAST) are then discussed and evaluated in light of this model. (ESA)

23305 **(MDC-H—0141) 10-MWe solar-thermal central-receiver pilot plant: receiver cold-flow (Test 1010) and receiver steam-generation (Test 1030) test report.** (McDonnell Douglas Astronautics Co., Huntington Beach, CA (USA)). Jan 1983. Contract AC04-76DP00789;AC03-79SF10499. 489p. NTIS, PC A21/MF A01. Order Number DE83009236.

Portions are illegible in microfiche products.

The combined test activities are documented for receiver startup tests for the Barstow Solar Pilot Plant, particularly the receiver cold flow controls preoperational test and the receiver steam generation controls test. Test program and results and supporting data are given for both series of tests. (LEW)

23306 **(PNL—4396) Technical and economic feasibility of salt-gradient solar ponds at the Truscott Brine Lake of the Red River Chloride Control Project. A report to the House-Senate Committee on Appropriations of the Ninety-Seventh Congress.** (Corps of Engineers, Tulsa, OK (USA); Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 75p. NTIS, PC A04/MF A01. Order Number DE83009474.

The Truscott Brine Lake is being constructed to impound highly brackish water from a number of sources which would normally flow into the Wichita River, a tributary of the Red River in Knox County, Texas. A 35.4-km (22-mile) pipeline is being constructed to carry the brines from their primary source to the Truscott Brine Lake site. The reservoir is designed to contain 100 years of brine emissions from three chloride emission areas in the Wichita River Basin. The solar ponds and power generating facilities would be located in the Bluff Creek Arm of Truscott Brine Lake. The Truscott Brine Lake study includes: survey of suitability of Truscott Lake site, review of solar pond technology, preconceptual design of solar salt pond power plant, and economic evaluation.

23307 **(SAND—82-8057) Investor and federal treasury returns from investing in solar-thermal energy.** Sharp, J.K.; Miller, G.J. (Sandia National Labs., Livermore, CA (USA)). Feb 1983. Contract AC04-76DP00789. 41p. NTIS, PC E04/MF A01. Order Number DE83008723.

Includes 5 sheets of 48x reduction microfiche.

As with any capital-intensive investment, the treasury shares the initial costs of solar-thermal investments with investors by providing a tax credit and depreciation deductions. Solar thermal investments have an additional tax credit called the Business Energy Investment Credit (BEIC). This report seeks to explain the probable returns to the federal government, as well as to third-party investors, from investing in the first commercial central-receiver plants. The results are a function of parameter assumptions (defined in the text) which were obtained from sources within the solar industry and government laboratories. Even with the increased initial cost to the treasury of the BEIC, a positive revenue will flow to the treasury over the lifetimes of the first solar power plants. Solar plant manufacturers need the BEIC to entice initial investors to accept the risk of investing in these plants. Future plants will be attractive investments without the BEIC. The computer code used in the analysis of expected returns is included in an appendix.

1408 Ocean Thermal Gradient And Salinity Gradient Power Systems

23308 **(DOE/ET/21002—T25) OTEC support services. Quarterly technical progress report No. 19, November 15, 1982-February 14, 1983.** (VSE Corp., Alexandria, VA (USA)). Mar 1983. Contract AC02-78ET21002. 10p. NTIS, PC A02/MF A01. Order Number DE83008700.

Activities relative to accomplishments and to meetings, conferences, etc. are reported in the areas of: OTEC commercialization support, program technical engineering and instrumentation analysis, technical and management services, OTEC systems integration, and transmission subsystem considerations. (LEW)

23309 **(PB—83-142570) Ocean Thermal Energy Conversion: environmental effects assessment program plan 1981-85.** (National Oceanic and Atmospheric Administration, Washington, DC (USA). Office of Ocean Minerals and Energy). Jun 1982. 63p. NTIS, PC A04/MF A01.

This plan describes the program of research for FY 1981-1985 that is necessary to begin to assess the effects on the environment of ocean thermal energy conversion facilities and plantships.

23310 **OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance.** Sasscer, D.S.; Morgan, T.O.; Rivera, C.; Tosteson, T.R.; Zaidi, B.R.; Revuelta, R.; Iman, S.H.; Axtmayer, R.W.; de Vore, D.; Ballantine, D.L. (Univ of PR, Mayaguez). *Ocean Science and Engineering;* 6: No. 4, 499-532(1981).

A biofouling test of 404 days was conducted on evaporator tubes of an ocean thermal energy conversion plant of the Center for Energy and Environmental Research. The fouling resistance (R/sub f/), total surface carbon and nitrogen content, ATP, and the wet film thickness (WFT) were determined throughout the test. Visual observations of the fouling film were made by light sectioning and scanning microscopy, and at the end of the test, a study was made of the macrofouling of the flow system. The results of these tests indicate that a base layer of bacteria and exudated polysaccharides enhance microbial adhesion and thereby create an environment conducive to rapid film growth. Fouling rates (dR/sub f// dt) for aluminum were generally higher than for titanium but they were linear for both materials and did not exceed 0.3(10/sup -4/)ft/ sup 2/-hr-/degree/F/Btu-day for either material during the 13-month study. Excellent correlation was found to exist between R/ sub f/ and WFT, which supports the hypothesis that it is the stagnant film of water entrapped by bacteria which is largely responsible for the insulating properties of the biofilm. The macrofouling study identified 61 species of benthic invertebrates representing ten phyla growing in those parts of the flow system, where flow was less than 3 fps but no macrofouling where the flow velocity significantly exceeded 3 fps. 24 refs.

1409 Solar Thermal Utilization

REFER ALSO TO CITATION(S) 23253, 23296, 23301, 23351, 23351, 23359, 23796, 23796, 23817

23311 **(ANL/NESC—991) FCHART/SLR2.0; solar heating system performance.** Chan, D. (Northeast Solar Energy Center, Boston, MA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048991.

Maxima of - 266 cities for which data is present in weather library 9 passive subsystems Performance of systems with heat pumps, absorption air conditioners, seasonal storage capacity, desiccant coolers, high minimum useable temperature requirements, etc. cannot be adequately estimated. The system load must be for space heating and/or water heating or must be similar to these with regard to minimum useable temperature and load distribution. The procedure for handling combined systems has not been validated. Because diurnal interaction between the two systems has not been taken in account, the performance analysis of a space heating system with both active and passive components should be considered as only an approximation.

FCHART/SLR is a tool that solar designers can use to predict the thermal and economic performance of solar heating systems. FCHART/SLR can analyze the performance of three general types of solar systems: active flat plate collector systems of standard configuration used for space and water heating, passive systems consisting of up to nine passive subsystems, or a combination of active and passive systems. The types of passive subsystems considered are: trombe wall, water wall, direct gain, and sunspace. FCHART/SLR can analyze the effect of each subsystem individually, as well as predict the performance of the composite system. As well as having a choice of the type of solar system to be analyzed, the user has a choice of the type of analysis to be performed: thermal analysis, economic analysis, or both thermal and economic

analysis. The economic analysis is based on standard life-cycle cost procedures.DEC20;DEC VAX11/780; FORTRAN 77; VMS 3.0 (DEC VAX11/780); The DEC20 version requires approximately 100K words of memory for execution; the VAX11/780 version requires 135,000 bytes of memory..

23312 **(BMFT-FB-T—79-100) System study on the possibilities of intensified use of solar energy in the Federal Republic of Germany (FRG).** Bell, C. R.; Jaeger, F.; Korzen, W. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Sep 1978. 155p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750330.

The state of the art of solar energy conversion technologies is synthesized in terms of technology assessment to identify possibilities of intensified use of solar options in the FRG. The developmental status of these technologies makes quantification of performance, as well as the cost effectiveness criteria speculative, yielding uncertainties in the delineation of future potential of solar options in comparison with other energy systems. Nevertheless, it is deemed essential to identify and evaluate the criteria for large-scale application of solar technology, in particular the probable time phase in which it might be competitive and/or necessary to minimize the impact of the anticipated shortages of conventional energy sources. Four options for solar energy conversion were selected as being of specific interest in the FRG: (1) Low temperature systems for space and water heating, (2) medium temperature systems for process heat, (3) high-temperature solar-thermal systems, (4) photovoltaic systems for electricity production. Energy storage alternatives were evaluated in connection with each of the concepts, to formulate economic viability of their future use. Performance and cost assessments of the contemporary developments were made to provide basis for projections, scenarios and market penetration criteria. Capital and energy payback estimates were made to develop visibility of the long-term potential of solar options. The synthesis indicated that the low temperature systems may offer the earliest potential, if further improvements and cost reduction are achieved. The potential of the other options remains uncertain until further developments prove successful.

23313 **(BMFT-FB-T—80-101) Measuring program for hot water supply in prefabricated houses using solar energy.** Reiss, H.; Reusch, H.P.; Schmidt, H.; Heidtmann, U. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Sep 1980. 74p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750347.

Portions are illegible in microfiche products.

A domestic water heating system for one-family houses designed for radiation data and climatic conditions of Central Europe has, since spring/autumn 1976, been installed on 6 different sites of West Germany. The system consists of 5 flat plate non-concentrating solar collectors (each of 1.1 m^2), a storage tank of 380 l and a difference measuring temperature control unit. The upper part of the storage tank is heated electrically, and a daily consumption of 180 l is simulated. The systems are each supplied with solarimeters measuring total incident radiation. Auxiliary electric energy and daily energy gain and system's performance are also recorded. Data accumulated since 1976 show that 3/4 of auxiliary electric energy can, in the summer months, be saved by solar energy. A correlation analysis demonstrates stable long term performance of the savings from hourly values of total incident radiation is described, and tests of systems's parameters are discussed.

23314 **(BMFT-FB-T—80-119) Solar energy model Goennebek.** Gerhards, B. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 133p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750361.

The project reported concerns the recovery, storage and saving of energy in greenhouses by making use of the sun's rays. It was the aim of the project to develop a greenhouse plant which, with respect to heat, is self-supporting, by making use of the long-term storage of the solar-energy collected from the sun's rays during the summer months. As a result of this development, independence from fossil fuels for the heating of the greenhouse, in combination with a considerable reduction in the heat requirement due to heat insulating facilities, has been achieved.

23315 **(CONF-810402—14) Corrosion problems associated with solar fluid and components.** Cheng, C.F.; Chen, C.P.; Wolosewicz, R.M. (ECA, Inc., Woodridge, IL (USA); Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 23p. NTIS, PC A02/MF A01. Order Number DE83008511.

From Corrosion/81 annual meeting; Toronto, Canada (6 Apr 1981).

Portions are illegible in microfiche products.

Corrosion and materials problems encountered in three commercial solar demonstration sites are reviewed. Failure analyses of solar components include outer/inner cover plates, absorber panels/tubes, collector outlet tubes, interconnecting hoses, heat exchangers and storage tank. In addition, preliminary laboratory tests on the corrosion of carbon steel, copper and aluminum in inhibited propylene glycol solution at stagnant-full temperature (178°C) are reported.

23316 **(CONF-820309—6) Direct solar steam-generating system.** Vresk, J. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008661.

From 3. international symposium on energy conservation in the built environment; Dublin, Ireland (30 Mar 1982).

A new technology is described that generates steam by the use of solar energy. Steam is generated directly in the solar collectors. The advantages of direct solar steam generation are compared with the methods of indirect solar steam generation that are now in use. In addition, schematics and modes of operation of a demonstration system are presented. To establish feasibility of the concept, and to obtain necessary design parameters, preliminary testing was conducted. Testing data establish the feasibility of direct solar steam generation. This concept is suitable for generating low-pressure steam (up to 240 kPa). The major applications are expected to be in process steam, absorption cooling, and steam heating.

23317 **(CONF-820681—2) Correlation of FCHART 4.0 with solar/heat-pump systems.** Bedinger, A.F.G.; Reid, R.L. (Tennessee Univ., Knoxville (USA)). 1982. 6p. Univ. of Tennessee, Mechanical and Aerospace Engineering Dept. Knoxville. Order Number DE83901529.

From Annual ASES meeting; Houston, TX, USA (1 Jun 1982).

Since 1976, experiments involving seasonal and annual thermal performance of space heating, cooling, and water heating systems have been carried out under a program called the Tennessee Energy Conservation in Housing Program, or TECH Program, at The University of Tennessee in Knoxville, Tennessee. During the 1980-1981 heating season, TECH House I was heated using a liquid based, series solar assisted heat pump. For the same period TECH House IV was heated using an air-based, parallel solar augmented heat pump. Hourly thermal performance and weather data were taken using a computerized automatic data acquisition system. These hourly data have been compiled into a monthly format and correlated with the FCHART 4.0 analysis and design computer program. It was found that there was a reasonably good correlation between the FCHART predictions and measured data for the fraction of non-purchased energy (FNP) for the systems studied. For both the series liquid system and the parallel air system, FCHART predicted an FNP within 16% of the measured data. FCHART predictions were, in both cases, higher than measured data.

23318 **(CONF-821101—19) TRNSYS/GROCS simulation of the TECH House I ground-coupled-series solar-assisted heat-pump system.** Roeder, D.J.; Reid, R.L. (Tennessee Univ., Knoxville (USA)). 1982. 8p. Univ. of Tennessee, Mechanical and Aerospace Engineering Dept., Knoxville. Order Number DE83901531.

From ASME winter annual meeting (Engineering applications of laser velocimetry/published in ASME Jr. Fluid Engineering); Phoenix, AZ, USA (14 Nov 1982).

The series solar-assisted heat-pump heating system with ground-coupled storage in The University of Tennessee's TECH

House I in Knoxville, Tennessee, has been modeled using TRNSYS/GROCS and was compared to the experimental performance for the 1980-1981 heating season. The simulation results were within 8% of the experimental measurements. Both simulation and experimental results showed that ground coupling of thermal storage led to the elimination of electric-resistance backup heat and a large reduction in the peak heating demand of the house. Results of a parametric study showed that, in general, a ground-coupled storage tank performs better than a storage tank place outdoors in the Knoxville area. Application of a next-generation heat pump resulted in the most significant impact on the seasonal performance factor. As expected, higher-performance collectors and larger collector areas led to higher system seasonal performance. An economic analysis showed that the series solar-heat-pump system cannot economically compete with the stand-alone heat-pump system in the Knoxville area.

23319 **(DOE/CS/30127—T1) Analytical investigations of the relative solar rating concept. Final report. Report Number FSEC 80-6.** Chandra, S.; Khattar, M.K. (Florida Solar Energy Center, Cape Canaveral (USA)). 20 Jun 1980. Contract AC01-79CS30127. 107p. NTIS MF A01. Order Number DE83005483.

Microfiche only, copy does not permit paper copy reproduction.

Analytical investigations using the TRNSYS computer program are conducted to determine the feasibility of the relative solar rating (RSR) concept. RSR is a single-day test and rating method for solar domestic hot water (SDHW) systems. In this procedure a test SDHW system and a baseline SDHW system are operated side-by-side for a single day with hot water drawn from both systems. The ratio of the daily solar fractions, called RSR/sub d/, is hopefully independent of test day conditions and uniquely related to the annual solar fraction ratios of the systems, called RSR. TRNSYS simulations for direct pumped SDHW systems in Miami, Santa Maria and Phoenix have shown that RSR/sub d/ is indeed nearly independent of test day conditions (which are satisfied by nearly 80 percent of the days of the year) and is uniquely correlated to RSR. The correlation curve and the baseline system long-term annual solar fraction need to be derived from validated TRNSYS simulations. The results for Boston, typifying a cold climate, were not very encouraging. The present study demonstrates RSR concept feasibility for the most popular type of SDHW system in the sunny and temperate southern United States, which has the greatest market potential for SDHW systems. However, an experimental research program is necessary to establish RSR as a viable alternative to ASHRAE 95-P, the only other SDHW system performance test procedure.

23320 **(DOE/CS/32393—T1) Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report.** (Ahern-MacVittie-Hofmann and Goodwin Architects Ltd., Tempe, AZ (USA); Timmerman Engineering Co., Inc., Phoenix, AZ (USA); Tempe Union High School District No. 213, AZ (USA)). 15 Jun 1982. Contract AC03-76CS32393. 136p. NTIS, PC A07. Order Number DE83009409.

Paper copy only, copy does not permit microfiche production; CAPE 2770, available from Technical Information Center, P.O. Box 62, Oak Ridge, TN 37840.

Presented is a description, summarization of theoretical operating analysis, and review comments of a solar assisted space heating and service hot water heating system installed at Corona del Sol High School in the Tempe Union High School District, Tempe, Arizona. The solar collectors used for the project are dual-glazed, flat plate type and cover a gross area of 20,563 sq ft or an aperture area of 17,675 sq ft facing due south at an angle of elevation of 32°. Collected energy is stored in an underground, steel tank with a volume of 50,000 gallons. The entire system is designed for collection and storage of 1.3 x 10^6 Btu of energy at the design day of January 21, at 33° N. Lat. The total system installed cost was $893,172 in a cost sharing agreement between the Department of Energy (DOE) and Tempe Union High School District (TUHS). The DOE portion of installed costs was $805,122 with TUHS providing the remaining $88,050. Translating the overall installed cost into a relationship with the collector's, one finds a cost of $43 per sq ft of installed collector. Reference CAPE-2770.

23321 **(EUR—6742-FR) Optimization of adsorbate-absorbent couples. Final report.** Dupuy, G. (Rhone-Poulenc SA, 75 - Paris (Frnce)). 1980. 80p. (In French). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82902442.

Portions are illegible in microfiche products.

A study is made of methods by which the sun's thermal energy can be used directly for desorption and the generation of classical absorption or adsorption systems. Tabular data are given on the physical characteristics of various refrigerants and zeolites. 20 references, 44 figures, 8 tables.

23322 **(EUR—7875-FR) Study of the effect that building insulation has on the actual fuel consumption. Final report.** Heikhaus, H.H.; Badot, J.; Laret, J.; Lebrun, J.; Nusgens, P. (Centre Scientifique et Technique de la Construction, Brussels (Belgium)). 1982. 394p. (In French). European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037. Order Number DE83901197.

A study is made of solar heating efficiency based on heating measurements made of a model solar-heated house at Plaineveaux, France, including the effect of external temperature changes and stationary parameters. Tabulated data are given on energy consumption with reference to various insulation materials and design of solar panels.

23323 **(NTISUB/A/024—75/002) Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975.** (New Mexico Univ., Albuquerque (USA). Technology Application Center). Apr 1976. 175p. (TAC/ST—75-603). NTIS. Order Number DE82901948.

Portions are illegible in microfiche products.

This annotated bibliography covers the following subjects: development; solar and atmospheric radiation; selected material properties; components, including: flat plate collectors, concentrating collectors, thermal storage, heat exchangers, coolers, heat pumps, solar ponds, and greenhouses; space heating and cooling; process heat; and power generators. (MHR)

23324 **(PB—83-119610) Development of an advanced solar augmented water heater. Final report Feb 80-May 82.** Grunes, H.; Morrison, D.; de Winter, F. (Altas Corp., Santa Cruz, CA (USA)). Jun 1982. 137p. NTIS, PC A07/MF A01.

A program was undertaken to design, construct and test two advanced prototype solar augmented gas water heaters. Computer analyses and experimental work were used to optimize components and characterize performance. The resulting design includes a solar preheat tank, a gas-fired backup tank, the collector loop pump and all operating controls contained in a single cylindrical package. The backup tank is positioned above the solar preheat tank. The connection between the solar and backup tanks is effectively a thermal diode which restricts heat transfer from the backup to the solar tank but allows the backup tank to become an integral part of solar storage whenever the solar tank temperature surpasses the backup tank set point temperature. Solar heat is supplied through a jacketed tank drainback system. Gas heat is supplied through a two phase thermosyphon heat exchanger. Testing showed the system to operate efficiently and reliably.

23325 **(PB—83-122663) Performance criteria for solar heating and cooling systems in residential buildings. Building science series (final).** (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Sep 1982. 240p. (NBS-BSS—147). NTIS, PC A11/MF A01.

This performance criteria, developed for the Department of Housing and Urban Development, is a baseline document for criteria and standards for the design, development, technical evaluation, and procurement of solar heating and cooling systems for residential buildings in accordance with the requirements of Section 8 of Public Law 93-409, the 'Solar Heating and Cooling Demonstration Act of 1974.' The document is intended to establish minimum levels of performance with regard to health and safety and the various aspects of technical performance. The criteria for health and safety put primary emphasis on compliance with existing codes and standards. The criteria on thermal and mechanical performance, durabil-

ity/reliability and operation/servicing present performance requirements considered to be representative of acceptable levels.

23326 **(SERI/TP—254-1492) Class B performance monitoring of passive/hybrid solar buildings.** Frey, D.; Swisher, J.; Holtz, M. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1981. Contract AC02-77CH00178. 8p. (CONF-820410—1). NTIS, PC A02. Order Number DE82010089.

From ASME solar energy conference; Albuquerque, NM, USA (26 Apr 1982).

Paper copy only, copy does not permit microfiche production.

The Class B Passive Solar Performance Monitoring Program is a low-cost program that evaluates the thermal performance of a large number of residential buildings throughout the country. The Class B instrumentation package is designed to calculate a basic energy balance on a building, separating the building energy load into passive solar heating, auxiliary heating, and internal heating. A microprocessor-based data acquisition system receives data on up to 22 channels every 15 seconds and stores channel averages hourly on cassette tape. The system calculates daily and monthly performance factors, including the building's major energy flows, in real time and then prints and stores them on a daily basis.

23327 **(SOLAR/0017—79/34) Instrumented solar-demonstration systems. Project description summaries, January 1979.** (National Solar Heating and Cooling Demonstration Program (DOE), Washington, DC (USA)). Jan 1979. 155p. NTIS, PC A08/MF A01. Order Number DE83008834.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

All solar demonstration sites included in the National Solar Data Network are briefly described, and an index identifying each project, site number, building type, and solar application is provided. Related solar reports are also listed. (LEW)

23328 **(SOLAR/0023—79/40) Thermal performance of space-cooling solar-energy systems in the National Solar Data Network.** Bartlett, J.C. (International Business Machines Corp., Huntsville, AL (USA)). Jul 1979. Contract AC01-77CS34049. 44p. NTIS, PC A03/MF A01. Order Number DE83008848.

Results derived from analysis of data obtained from monitoring the operation of four solar energy cooling installations in the National Solar Data Network are presented. It is shown that chiller coefficients of performance (COP) on the order of 0.65 can be easily obtained with existing technology, provided the designer adequately matches the solar energy system to the absorption chiller. It is also shown that flat-plate, concentrating, and evacuated tube collectors may each be used successfully to operate absorption chillers in space cooling systems. The results show that appreciation for the systems engineering aspects of solar energy is extremely important to the development of a viable industry.

23329 **(SOLAR/0025—79/42) Thermal-performance analysis of space-heating systems in the National Solar Data Network.** Britnell, O. (International Business Machines Corp., Huntsville, AL (USA)). Jul 1979. Contract AC01-77CS34049. 37p. NTIS, PC A03/MF A01. Order Number DE83008830.

Space heating applications account for a significant portion of the national demand on energy supplies. The performance of several solar energy space heating systems in the National Solar Heating and Cooling Demonstration Program is summarized. The solar energy utilization is depicted graphically, along with the identification of system losses. In addition, problems which appear to have the most severe impact on system performance are described. All space heating systems being monitored, and the characteristics of each are tabulated.

23330 **(SOLAR/1002—79/14) Solar-energy-system performance evaluation: Washington Natural Gas Company, Kirkland, Washington, January 1979-March 1979.** Messerly, C.D. (International Business Machines Corp., Gaithersburg, MD (USA)). 1979. Contract AC01-77CS34049. 60p. NTIS, PC A04/MF A01. Order Number DE83008849.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Washington Natural Gas Company is a single-family residence in Washington whose solar heating system is used for space heating the home and preheating domestic hot water. The system has an array of flat-plate air-based collectors, rock bed storage, and a gas furnace for auxiliary heat. Four modes of operation are described. Results of a thermal performance analysis of the system are presented, covering operation of the system from January 1979 through March 1979. The system is described, and its thermal performance is analyzed using a system energy balance technique. The individual subsystems applicable to the site are assessed in detail. (LEW)

23331 **(SOLAR/1013—79/14) Solar-energy-system performance evaluation: J. D. Evans, Inc., House B, Columbia, Maryland, November 1978-March 1979.** Fu, C.M. (International Business Machines Corp., Gaithersburg, MD (USA)). 1979. Contract AC01-77CS34049. 64p. NTIS, PC A04/MF A01. Order Number DE83008837.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

J.D. Evans, Inc., House B is one of two instrumented single-family residences in Columbia, Maryland. Its solar heating system is used for space heating the home and preheating domestic hot water. The solar heating system consists of an array of water-based flat-plat collectors and a 1000-gallon steel storage tank. Auxiliary heat is provided by a heat exchanger within a heat pump and electrical heating elements in both the air-distribution duct and the hot water tank. The system is described and its performance is analyzed using a system energy balance technique. Individual subsystems applicable to the site are assessed in detail. (LEW)

23332 **(SOLAR/1015—79/14) Solar-energy-system-performance evaluation: Perl-Mack Enterprises, Inc., single-family residence, Denver, Colorado, April 1978-March 1979.** Walker, R.V. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 68p. NTIS, PC A04/MF A01. Order Number DE83008838.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Perl-Mack Enterprises, Inc. site is a single-family dwelling whose solar heating system is designed to provide approximately 68% of the annual space heating and hot water requirements. The system consists of an array of flat plate collectors using a water-propylene glycol solution, a concrete water storage tank, and an auxiliary gas burner. The system is described, and its performance is analyzed using a system energy balance technique. (LEW)

23333 **(SOLAR/1034—79/14) Solar-energy-system performance evaluation: Alpha Construction Co. single-family residence, Canton, Ohio, October 1978-March 1979.** Rankin, F.A. (International Business Machines Corp., Gaithersburg, MD (USA)). 1979. Contract AC01-77CS34049. 68p. NTIS, PC A04/MF A01. Order Number DE83008839.

The Alpha Construction Company site is a single-family residence in Canton, Ohio whose solar heating system provides space heating and preheating for domestic hot water. The system consists of an array of flat plate solar air heaters, a rock bed, and water tanks, and auxiliary heating is provided by a heat pump and electrical heating element. The system is described, and its thermal performance is analyzed using a system energy balance technique. The individual subsystems are assessed in detail. (LEW)

23334 **(SOLAR/1043—79/14) Solar-energy-system performance evaluation: Hullco Construction Company single-family residence, Prescott, Arizona, May 1978-April 1979.** Weston, M.W. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 65p. NTIS, PC A04/MF A01. Order Number DE83008829.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Hullco Construction solar energy system is a combination greenhouse and direct gain passive system for a single-family residence in Arizona. The system is described, and its performance is analyzed using a system energy balance technique. (LEW)

23335 (SOLAR/1045—79/14) Solar-energy-system performance evaluation: Montecito Pines apartment complex, Santa Rosa, California, November 1978-March 1979. Hughes, J.E. (International Business Machines Corp., Gaithersburg, MD (USA)). 1979. Contract AC01-77CS34049. 62p. NTIS, PC A04/MF A01. Order Number DE83008840.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Montecito Pines site is an apartment complex in Santa Rosa, California whose water-based solar space heating and water preheating system has an array of flat plate collectors that are freeze protected by drain-down, an underground 2000-gallon storage tank, and an auxiliary gas-fired boiler. The system and its operation are briefly described, and its performance is analyzed using a system energy balance technique. Individual subsystems are assessed in detail. (LEW)

23336 (SOLAR/1046—79/14) Solar-energy-system performance evaluation: Living Systems single-family residence, Davis, California, October 1978-March 1979. Kinnie, I.G. (International Business Machines Corp., Gaithersburg, MD (USA)). 1979. Contract FG03-78SF01932;AC01-77CS34049. 49p. NTIS, PC A03/MF A01. Order Number DE83008828.

The Living Systems site is a single-family residence in Davis, California whose solar energy system consists of two independently-controlled systems: an active system for preheating domestic hot water, and a passive system for space heating. The passive solar space heating system is of the direct gain type with heat stored in steel tubes containing 3600 gallons of water. Only the space heating system is discussed. The system is described, and its performance is analyzed using a system energy balance technique. The individual subsystems are assessed in detail. (LEW)

23337 (SOLAR/1051—79/14) Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979. Weston, M.W. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 65p. NTIS, PC A04/MF A01. Order Number DE83008827.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Colorado Sunworks solar energy system is a passive solar energy system used for both space heating and domestic hot water preheating at a single family dwelling in Longmont, Colorado. The passive space heating system is a combination drum wall and direct gain system. Heat loss through the glazing is reduced by a beadwall. The passive solar water heater system consists of two 30-gallon tanks which have been stripped of their insulation, painted black, and positioned next to the south wall. The system is described, and its performance is analyzed using a system energy balance technique. (LEW)

23338 (SOLAR/1087—79/14) Solar-energy-system performance evaluation: Ortiz and Reill Developers, Inc., Lot 8 single-family residence, Escondido, California, October 1978-March 1979. Fontaine, D.C. (International Business Machines Corp., Gaithersburg, MD (USA)). 1979. Contract AC01-77CS34049. 65p. NTIS, PC A04/MF A01. Order Number DE83008841.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Ortiz and Reill Developers, Inc., House Lot 8, is one of two instrumented single-family residences in Escondido, California. Its solar heating system provides space heating and domestic hot water and has an array of water-based flat plate collectors and a 750-gallon heat storage tank. The system is described, and its performance is analyzed using a system energy balance technique. The individual subsystems are assessed in detail. (LEW)

23339 (SOLAR/2003—79/14) Solar-energy-system performance evaluation: Scattergood School Recreation Center, West Branch, Iowa, June 1978-April 1979. Shenfish, K.L. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 80p. NTIS, PC A05/MF A01. Order Number DE83008826.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The solar energy system at Scattergood School in Iowa is designed to supply space heating and hot water and is also used to dry grain. The system has an array of flat plate solar air heaters connected to a pebble bed and two 120-gallon tanks. Back-up heat is furnished by two gas heaters for space heating and a 52-gallon electric water heater. The system is briefly described, and its thermal performance is analyzed using a system energy balance technique. (LEW)

23340 (SOLAR/2009—79/14) Solar-energy-system performance evaluation: Rademaker Corporation office and warehouse building, Louisville, Kentucky, October 1978-March 1979. Walker, R.V. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049;AC01-76CS32385. 87p. NTIS, PC A05/MF A01. Order Number DE83008846.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The solar heating system described provides space heating and hot water to an office building and warehouse in Kentucky. The installation has a system of flat plate collectors using a propylene glycol solution and another array of solar air heaters. In the first system, heat is stored in tanks, and in the second system, heat is stored in crushed rock. The system is described, and its performance is analyzed using a system energy balance technique. (LEW)

23341 (SOLAR/2011—79/14) Solar-energy-system performance evaluation: Terrell D. Moseley office building, Lynchburg, Virginia, October 1978-March 1979. Dwiggins, J.C. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-76CS32388;AC01-77CS34049. 59p. NTIS, PC A04/MF A01. Order Number DE83008835.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The solar energy described provides space heating and hot water for an office building and warehouse in Virginia. Only the space heating system is monitored. The system consists of an array of 24 water-based flat plate collectors and a 2000-gallon storage tank. Auxiliary space heating is provided by a gas-fired boiler. Freeze protection is by automatic draining. The system is briefly described, and its performance is analyzed using a system energy balance technique. (LEW)

23342 (SOLAR/2014—79/14) Solar-energy-system performance evaluation: Blakedale Professional Center Office Suite, Greenwood, South Carolina, October 1978-March 1979. Thomas, J.A. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 63p. NTIS, PC A04/MF A01. Order Number DE83008844.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The solar heating system reported is designed to provide space heating and water heating for a South Carolina office suite. The system consists of an array of water-based flat plate collectors, a storage tank, an auxiliary heat pump and electric resistance heater, and auxiliary electric water heater. Freeze protection is provided by drain-down. The system and its operation are briefly described, and its thermal performance is analyzed using a system energy balance technique. (LEW)

23343 (SOLAR/2018—79/14) Solar-energy-system performance evaluation. Reedy Creek Utility District office building, Lake Buena Vista, Florida, September 1978-February, 1979. Smith, H.T. (Science Applications, Inc., Huntsville, AL (USA); International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 64p. NTIS, PC A04/MF A01. Order Number DE83008845.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Reedy Creek site is a two-story office building in Florida whose solar heating system provides space heating and domestic hot water and space cooling. The system consists of an array of parabolic trough collectors, an absorption chiller, a 10,000-gallon hot water tank and a 10,000-gallon cold water tank. The system and its operation are briefly described, and its performance is analyzed using a system energy balance technique. (LEW)

23344 **(SOLAR/2021—79/14) Solar-energy-system performance evaluation: Irvine School (El Camino Real Elementary School) Irvine, California, October 1978-March 1979.** Smith, H.T. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 63p. NTIS, PC A04/MF A01. Order Number DE83008843.

Portions are illegible in microfiche products.

The Irvine School in California has a solar heating and cooling system consisting of evacuated tube collectors, two absorption chillers, a heat rejector, and heat exchanger. The system and its operation are briefly described, and its performance is analyzed using a system energy balance technique. The performance of major subsystems is also presented. (LEW)

23345 **(SOLAR/2036—79/14) Solar-energy-system performance evaluation: Page Jackson Elementary School, Charles Town, West Virginia, November 1978-March 1979.** Smith, H.T. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 60p. NTIS, PC A04/MF A01. Order Number DE83008825.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The solar energy system reported is designed to provide space heating and cooling for a West Virginia elementary school. It has an array of water-based flat plate collectors freeze protected through a drain-down system, two 10,000-gallon storage tanks, and an absorption chiller. There are an oil-fired boiler and a centrifugal chiller for back-up. The system and its operation are briefly described, and its space heating performance is analyzed using a system energy balance technique. The performance of major subsystems is also presented. (LEW)

23346 **(SOLAR/2041—79/14) Solar-energy-system performance evaluation: Northview Elementary School (Howard's Grove) Howard's Grove, Wisconsin, September 1978-April 1979.** Shenfish, K.L. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 72p. NTIS, PC A04/MF A01. Order Number DE83008842.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Northview Elementary School in Howard's Grove, Wisconsin is provided space heating by a system consisting of an array of flat plate air collectors and a rock bed. Auxiliary heat is supplied by a fuel oil boiler. The system and its operation are briefly described, and its performance is analyzed using a system energy balance technique. The performance of major subsystems is also presented. (LEW)

23347 **(SOLAR/2041—79/60) Solar-project cost report for Howard's Grove School, Howard's Grove, Wisconsin.** (Mueller Associates, Inc., Baltimore, MD (USA)). 9 Apr 1979. 27p. NTIS, PC A03/MF A01. Order Number DE83008836.

Detailed cost information is provided for the solar space heating project at the Howard's Grove School in Howard's Grove, Wisconsin. The system utilizes 138 flat plate air collectors which provide an effective aperture area of 2277 square feet. The collectors are mounted in 6 rows of 23 collectors on the flat roof of the building. The 1620 cubic foot rock storage bin is partially buried under the mechanical room floor. The construction costs of this solar space heating system are presented. Category costs are listed by materials, labor, and subcontract cost. The subcontract costs include materials, labor, overhead, and profit costs for some of the support structure costs and for construction of stairs to the raised mechanical room floor. No further break down of these costs could be obtained. The construction cost for this project was $43,165 not including construction management overhead and profit and general and administrative costs. A more detailed account of the data base and category cost components is provided.

23348 **(SOLAR/2048—79/14) Solar-energy-system performance evaluation. Concord Light Plant municipal garage and office building, Concord, Massachusetts, November 1978-March 1979.** Gregory, D. (International Business Machines Corp., Huntsville, AL (USA)). 1979. Contract AC01-77CS34049. 61p. NTIS, PC A04/MF A01. Order Number DE83008824.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The solar energy installation at the Concord Light Plant in Concord, Massachusetts provides space heating for a municipal garage and office area and consists of an array of flat plate solar air heaters and a rock thermal storage bin. Auxiliary heating is provided by electrical resistance heaters. The system and its operation are described briefly, and its performance is analyzed using a system energy balance technique. The performance of major subsystems is also presented. (LEW)

23349 **Comparative report of solar heating system performance.** Holte, H.O.; Kendall, P.W. (Autom Ind Inc, Silver Spring, MD, USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* 631-647(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

Five heating sites of the National Solar Data Network of the Department of Energy were analyzed. Monthly average performance indices have been calculated based on measured values. Performance indices (efficiencies, etc.) were calculated and compared. Two of the sites (in Rhode Island and in Massachusetts) were clearly operating at higher efficiencies based on the calculated performance indices. All of the sites are examples of common active solar systems which appear to be designed using "rules thumb" described in the literature.

1410 Solar Collectors And Concentrators

REFER ALSO TO CITATION(S) 23259, 23306, 23323

23350 **(ALO—5365-4) Laminar natural convection in an inclined rectangular box with the lower surface half heated and half insulated.** Ozoe, H.; Chao, P.K.B.; Churchill, S.W.; Lior, N. (Okayama Univ. (Japan). Dept. of Industrial and Mechanical Engineering; Mobil Research and Development Corp., Paulsboro, NJ (USA); Pennsylvania Univ., Philadelphia (USA)). 1982. Contract AC04-78CS35365. 7p. (CONF-820604—13). NTIS, PC A02/MF A01. Order Number DE83008760.

From AIAA/ASME joint conference on fluids, plasma, thermophysics and heat transfer; St Louis, MO, USA (7 Jun 1982).

Portions are illegible in microfiche products.

The pattern of circulation and the rate of heat transfer were determined experimentally and also by three-dimensional finite-difference calculations for an inclined 2 x 1 x 1 rectangular enclosure with a 1 x 1 segment of the lower 2 x 1 surface at a uniform temperature, the other 1 x 1 segment and four side walls insulated, and the upper surface at a lower uniform temperature. A critical Rayleigh number does not exist for this thermal boundary condition; fluid motion occurs and the rate of heat transfer exceeds that for pure conduction for all temperature differences and orientations. The effects of elevation of the heated and insulated segments were investigated, as well as of inclination about the longer dimension. The observed and predicted patterns of circulation are in good agreement. The measured rates of heat are in qualitative agreement with the predictions.

23351 **(BMFT-FB-T—79-85) Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system.** Elchlepp, R. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 59p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750320.

Portions are illegible in microfiche products.

Since June and October 1976, respectively, thermodynamic measurements are performed with solar experimental systems, which had been integrated into solar experimental houses at Hoe-

henkirchen and Otterfing. All essential qualitative and quantitative test results are summarized up to the end of 1977, discussion of test results and conclusions included.

23352 **(Juel—1783) Plastic solar air heaters of a novel design.** Bansal, N.K.; Uhlemann, R.; Boettcher, A. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Programmgruppe Systemforschung und Technologische Entwicklung). Apr 1982. 48p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750146.

A novel design of solar air heaters of porous type made completely from plastic materials has been forwarded for typical applications like crop drying, domestic water and space heating etc. An experimental test facility brought up to study the thermal performance of these collectors has been described.

23353 **(PB—83-135095) Determination of incident angle modifiers for flat-plate solar collectors. Final report.** Thomas, W.C.; Dawson, A.G. III; Waksman, D.; Streed, E.R. (National Bureau of Standards, Washington, DC (USA)). 1982. 10p. Pub. in Proceedings of the ASME Solar Energy Division Annual Conference (4th), Albuquerque, New Mexico, 26-29, 1982, p501-510.

Existing test procedures for measuring and rating thermal performance require the determination of the angular response of collectors in order to account for non-normal incident beam irradiance. Angular response measurements for four different types of collectors, each type tested by three different laboratories, are presented and analyzed. Substantial differences, both within and between laboratories, are reported for the same type collectors.

23354 **(SP-MET—1979:2) Sp-c12-301: thermal performances of solar energy absorbers.** Andersson, H.E.B. (Statens Provningsanstalt, Boraes (Sweden)). Nov 1979. 28p. (In Swedish). NTIS, PC A03/MF A01.

The testing scheme applies to the case of absorbers where the heat carrier is a liquid passing from a single inlet to a single outlet. The absorbers are intended as part of a roof and must be tested in a standardized construction. Thermal efficiency, losses and the influence of the angle of incidence are discussed. The total solar flux in the plane of the absorber must be at least 600 W/sqm, normally 800 to 1100 W/sqm. A Sun-simulator may also be used for testing.

23355 **Effect of fining agents on the solarization of a borosilicate glass.** Vitko, J. Jr.; Shelby, J.E. (Sandia Natl Lab, Livermore, CA, USA). *Journal of the American Ceramic Society;* 65: No. 6, C86-C87(Jun 1982).

The effects of both fining agents and TiO/sub 2/ concentration on the solarizability of a borosilicate glass proposed for solar energy applications have been determined. Optical and electron spin resonance measurements indicate that chlorine-fined glasses are much less susceptible to solarization than are arsenic-fined glasses. Titanium dioxide acts as a solarization suppressant with either fining agent. The observed increase in optical absorption in the visible region is in marked contrast with the recent report of a solar-induced decrease in optical absorption in the infrared range for soda-lime silicate glasses. 3 refs.

1420 Heat Storage

REFER ALSO TO CITATION(S) 23323, 23663

23356 **(CONF-820814—44) Storing solar energy in thermally stratified tanks.** Cole, R.L.; Bellinger, F.O. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 7p. NTIS MF A01. Order Number DE83008667.

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

Microfiche only, copy does not permit paper copy reproduction.

Described are: how solar-system tanks fail to stratify, a new solar-system control strategy that allows stratification, a one-dimensional analytical model of thermally stratified tanks, experimental measurement of thermal stratification in tanks, and a correlation of experimental measurements with empirical constants in the analytical model. Failure to stratify is explained in terms of the critical Richardson number. The key to the new control strategy is to avoid a Richardson number that decreases during solar collection. The analytical model is an approximate solution containing two empirical constants. The empirical constants were adjusted to obtain the best least-squares fit with experimental data and correlated with the Fourier and Richardson numbers. The new control strategy allows tanks to stratify and reduces the average collector operating temperature by as much as 20°C. Several features of tank design that improve thermal stratification are also described.

23357 **(EUR—6668-EN) Latent heat storage for solar energy systems.** Birnbreier, H.; Ziegenbein, B.; Heidtmann, U.; Schemenauer, K. (Brown, Boveri und Cie A.G., Heidelberg (Germany, F.R.). Zentrales Forschungslabor; Sueddeutsche Metallwerke G.m.b.H., Walldorf (Germany, F.R.)). 1980. 164p. (In German). NTIS (US Sales Only), MF A01. Order Number DE82902428.

Microfiche only, copy does not permit paper copy reproduction.

A study is made of the development and testing of latent heat organic and inorganic heat storage and operational characteristics in comparison to water storage in solar heating plants. 22 references, 50 figures, 15 tables.

23358 **(PB—83-132126) Compact latent-heat thermal storage systems utilizing phase changes within the temperature range of 320 K and 340 K. Final report.** Stall, J.; Hennemann, B. (Commission of the European Communities, Luxembourg). [nd]. 41p. (In German). (EUR—7698-DE). NTIS, PC E03/MF E03.

The experimental design of small-scale solar heat storage systems is described which utilize the phase changes of certain organic or inorganic compounds in accordance with endothermal or exothermal conditions, i.e. heat input or output. Paraffin waxes, natural fats, etc. were tested for their suitability as heat storage media. Tests showed that such a system is feasible for domestic use but that a low-cost heat storage medium must be found with an enthalpy change within a narrow temperature band and phase changes comparable with paraffin wax. Other 'cushion' materials besides polyethylene, nylon, and aluminum foil must be investigated.

23359 **(PB—83-132134) Development of a thermal storage system based on the heat of absorption in hygroscopic materials. Final report.** Verdonschot, J.K.M.; den Ouden, C. (Commission of the European Communities, Luxembourg). [nd]. 64p. (EUR—7699-EN). NTIS, PC E04/MF E04.

The aim of the research work was to develop a heat storage system using a solid adsorbent as storage medium and to study the behavior of the system as a component of a total airbased solar heating system. The results were used in a computer simulation model describing the interaction between the components of a solar heating installation in terms of actual hourly heat flows during one year. The result was a guideline for the design of a prototype heat storage system from which the complete design of an air-based solar heating system emerged.

23360 **Heat pump apparatus.** Horowitz, J.S.; Nelson, P.A. (to Dept. of Energy). US Patent 4,372,376. 8 Feb 1983. Filed date 9 Dec 1980. vp.

PAT-APPL-214807.

A heat pump apparatus including a compact arrangement of individual tubular reactors containing hydride-dehydride beds in opposite end sections, each pair of beds in each reactor being operable by sequential and coordinated treatment with a plurality of heat transfer fluids in a plurality of processing stages, and first and second valves located adjacent the reactor end sections with rotatable members having multiple ports and associated portions for separating the hydride beds at each of the end sections into groups and for simultaneously directing a plurality of heat transfer fluids to the different groups. As heat is being generated by a group of beds, others are being regenerated so that heat is continuously available for space heating. As each of the processing stages is completed for a hydride bed or group of beds, each valve member is rotated caus-

ing the heat transfer fluid for the heat processing stage to be directed to that bed or group of beds. Each of the end sections are arranged to form a closed perimeter and the valve member may be rotated repeatedly about the perimeter to provide a continuous operation. Both valves are driven by a common motor to provide a coordinated treatment of beds in the same reactors. The heat pump apparatus is particularly suitable for the utilization of thermal energy supplied by solar collectors and concentrators but may be used with any source of heat, including a source of low-grade heat.

15 GEOTHERMAL ENERGY

REFER ALSO TO CITATION(S) 23762

23361 **(EUR—7265-EN) Abstracts of final reports of the first R and D programme on geothermal energy.** (Commission of the European Communities, Luxembourg). [nd]. 81p. NTIS, PC E05/MF E05.

The abstracts of the available Final Reports of the first R and D program on geothermal energy have been compiled and classified by topic as follows: Regional exploration - Reservoir assessment; Local exploration - Drilling; Temperature, heat flow, downhole instrumentation; Geophysics; Geochemistry; Exploitation of geothermal resources; and Hot dry rocks.

1502 Geology And Hydrology Of Geothermal Systems

REFER ALSO TO CITATION(S) 23374, 23380

23362 **(ANL/NESC—802) SCHAFF; heat & water transfer in porous media.** Sorey, M.L.; Lippmann, M.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048802.

The equations used do not include source terms. With a mass source, such as a recharge or discharge well, the flow field would not necessarily equilibrate within each thermal cycle.

The SCHAFF (Slightly Compressible Heat and Fluid Flow) program was developed for numerical modeling of liquid geothermal systems involving natural convection and hot spring discharge. For one-, two-, or three-dimensional porous media, the single-phase fluid and heat transfer equations are solved interlaced in time, using an integrated finite difference method. The mathematical model describing the physical behavior of hot-water geothermal systems is used to analyze natural or cellular convection in permeable layers heated from below.CDC7600; FORTRAN IV; SCOPE 2.1; The program requires approximately 110K words of central memory for execution. Standard system input and print and punch output units are required along with units for temporary storage of two tape or disk files.

23363 **Geology and geothermal resources of the eastern Centennial Valley.** Sonderegger, J.L. (Montana Bureau of Mines and Geology, Butte). *Montana Geological Society, Annual Field Conference, Guidebook;* 357-363(1981). Contract AA07-76RL02426.

An investigation was conducted in the basement province of McMannis (Montana) which is typified by the absence of Belt strata, a generally Paleozoic and Mesozoic sequence, abundant Cenozoic basin deposits and volcanic ejecta, and extensive exposures of pre-Belt metamorphic rock. The study area is bounded to the West by the Tendoy Mountains, and Snowcrest Range, the easternmost ranges with proven thrust faulting as the dominant Laramide structural mechanism. Late Cenozoic mountain formation is due to block faulting. To the north, south, and east, the Gravelly, and Centennial ranges, and the Henry's Lake Mountains, respectively, are believed to be formed by block faulting. Most of the structural grain has been previously ascribed to the Laramide orogeny. The geologic framework of the study area is described and an interpretation of its Cenozoic history is given. Warm water occurrences were found to be restricted to the north side of the Centennial Valley. A total of seven springs have a combined discharge of about 2700 gallons per minute and an average temperature of 27°C. A zone of water approximately 5°C above the background temperature was depicted along the western half of the north side of Upper Red Rock Lake and along the marshy channel connected it with the Lower Red Rock Lake. Location of the spring discharge appears to be controlled by both Laramide and Tertiary structures. The chemistry of the spring and well waters is discussed. (MCW)

1503 Geothermal Exploration And Exploration Technology

23364 **(ANL/NESC—978) SLUMB.REV0; one-dimensional Schlumberger inversion program.** Killpack, T. (Utah Univ., Salt Lake City (USA). Earth Science Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048978.

SLUMB accepts field data from a Schlumberger resistivity array and inverts it in terms of a one-dimensional layered geoelectrical model. Because the inverse problem is nonlinear, an initial guess model is required; this can be obtained by traditional curve matching or by repeated use of the forward algorithm.UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%); EXEC8; 22,000 words of memory are required for execution. Unit 3 is used as an alternate print file..

23365 **(ANL/NESC—981) PLANMAP.REV1; plots geochemical data in plan.** Withrow, C. (Utah Univ., Salt Lake City (USA). Earth Science Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048981.

Maxima of - 400 sample locations 194 elements or types of assays The program has no map projection capabilities and is used to plot relatively small work areas where a flat earth approximation can be used.

PLANMAP, which consists of two interactive programs, PLAN-IO and PLAN-PLOT, is used to plot geochemical data in plan. Data are supplied by keyboard entry and can be listed, edited, and plotted. The input data consist of geochemical sample assay values and the coordinates that describe the locations of these samples. The output consists primarily of a plot that represents a map showing the data for one selected element or assay. The data may be modified in various ways, such as editing, adjusting assay value according to silicate content of sample, and mathematical function mapping. Various symbols may be selected to represent the sample locations on the plot. When producing the plot, the user interactively specifies parameters such as plot size, units, and scale factors. The data for one problem area may be saved and another retrieved, all under program control. Map section corner coordinates may be included as input data and either a keyboard or line printer listing of the data may be obtained, if desired.UNIVAC1108,1100; FORTRAN V (97%) and Assembly language (3%); EXEC8; 12,000 words of memory are required to execute PLAN-IO; RUNLP and PLAN-PLOT require 5,000 and 7,000 words, respectively. PLAN-IO requires a work file (unit 1) and a merge file (unit 2) on a direct-access file. RUNLP and PLAN-PLOT require the work file only..

23366 **(ANL/NESC—985) SPXCPL; two-dimensional modeling of self-potential effects.** Sill, W.R.; Killpack, T.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048985.

The input model and solution are limited to two-dimensional geologic structures. The size of the mesh is fixed at 11 x 66 cells.

SPXCPL is a two-dimensional modeling program of self-potential effects from cross-coupled fluid and heat flow. The geological structure is two-dimensional, but the sources can be either finite line sources or point sources. The self potential (SP) method is based on the measurement of naturally occurring potential differences generated mainly by electrochemical, electrokinetic, and thermoelectric sources. The SP method of geophysical interpretation is used in geothermal exploration, earthquake-related phenomena, and in other engineering applications.PRIME400;DEC VAX11/780; FORTRAN IV; PRIMOS IV (PRIME400), VMS 3.0 (DEC VAX11/780); SPXCPL uses 8K words for program storage, 55K

words of data, and 19K words of common data on the PRIME400 system. 160K bytes of virtual storage are required on the VAX11/780..

23367 **(ANL/NESC—990) IP2D.REV1; resistivity & induced-polarization.** Killpack, T.J.; Hohmann, G.W. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048990.

Maxima of - 100 models stored on the merge file 78 x-elements in the mesh 20 z-elements in the mesh 6 dipole separations IP2D is set up to use 17 electrode positions for the transmitting and receiving electrodes.

IP2D is an interactive IP-resistivity modeling system designed to model arbitrary two-dimensional IP-resistivity structures for comparison with data from dipole-dipole surveys. The system is made up of a group of nine main programs chained together. Two of these are batch-mode oriented. Control is passed between the programs by means of a system routine.UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%); EXEC8; The largest of the nine programs requires 58,000 words of memory. IP2D uses two random access data files. The work file (unit 1) is used to hold the data for a single model and computed results. A merge file (unit 2) is used to store copies of the work file..

23368 **(DOE/ET/28365—24) Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22.** Pearl, R.H.; Zacharakis, T.G.; Ringrose, C.D. (Colorado Dept. of Natural Resources, Denver (USA)). 1983. Contract AS07-77ET28365. 95p. NTIS, PC A05/MF A01. Order Number DE83009096.

An assessment of the Steamboat Springs region in northwest Colorado was initiated and carried out in 1980 and 1981. The goal of this program was to delineate the geological features controlling the occurrence of the thermal waters (temperatures in excess of 68°F (20°C)) in this area at Steamboat Springs and 8 miles (12.8 km) north at Routt Hot Springs. Thermal waters from Heart Spring, the only developed thermal water source in the study area, are used in the municipal swimming pool in Steamboat Springs. The assessment program was a fully integrated program consisting of: dipole-dipole, Audio-magnetotelluric, telluric, self potential and gravity geophysical surveys, soil mercury and soil helium geochemical surveys; shallow temperature measurements; and prepartion of geological maps. The investigation showed that all the thermal springs appear to be fault controlled. Based on the chemical composition of the thermal waters it appears that Heart Spring in Steamboat Springs is hydrologically related to the Routt Hot Springs. This relationship was further confirmed when it was reported that thermal waters were encountered during the construction of the new high school in Strawberry Park on the north side of Steamboat Springs. In addition, residents stated that Strawberry Park appears to be warmer than the surrounding country side. Geological mapping has determined that a major fault extends from the Routt Hot Springs area into Strawberry Park.

23369 **(DOE/ET/28365—26) Geothermal-resource assessment of Ranger Warm Spring, Colorado. Resources Series 24.** Zacharakis, T.G.; Pearl, R.H.; Ringrose, C.D. (Colorado Dept. of Natural Resources, Denver (USA)). 1983. Contract AS07-77ET28365. 72p. NTIS, PC A04/MF A01. Order Number DE83009097.

Portions are illegible in microfiche products.

In 1977 a program was initiated to delineate the geological features controlling the occurrence of geothermal resources in Colorado. This program consisted of literature search, reconnaissance geologic and hydrogeologic mapping and geophysical and geochemical surveys. During 1980 and 1981 geothermal resource assessment efforts were conducted in the Cement Creek Valley south of Crested Butte. In this valley are two warm springs, Cement Creek and Ranger, about 4 mi (6.4 km) apart. The temperature of both springs is 77 to 79°F (25 to 26°C) and the discharge ranges from 60 to 195 gallons per minute. Due to access problems no work was conducted in the Cement Creek Warm Springs area. At Ranger Warm Springs electrical resistivity and soil mercury surveys were conducted. The warm springs are located in the Elk Mountains of west central Colorado. The bedrock of the area consists of sedimentary rocks ranging in age from Precambrian to Recent. Several faults with displacements of up to 3000 ft (194 m) are found in the area. One of these faults passes close to the Ranger Warm Springs. The electrical resistivity survey indicated that the waters of Ranger Warm Springs are moving up along a buried fault which parallels Cement Creek.

23370 **(DOE/ID/01821—T1) Seismic baseline and induction studies: Roosevelt Hot Springs, Utah and Raft River, Idaho.** Zandt, G.; McPherson, L.; Schaff, S.; Olsen, S. (Utah Univ., Salt Lake City (USA). Earth Science Lab.). May 1982. Contract AS07-78ID01821. 60p. NTIS, PC A04/MF A01. Order Number DE83008990.

Portions are illegible in microfiche products.

Local seismic networks were established at the Roosevelt Hot Springs geothermal area, utah and at Raft River geothermal area, Idaho to monitor the background seismicity prior to initiation of geothermal power production. The Raft River study area is currently seismically quiet down to the level of approximately magnitude one. The Roosevelt Hot Springs area has low-level seismic activity for M/sub L/ greater than about two; however, microearthquake (M/sub L/ $\leq$ 2) swarms appear to be relatively common. One swarm occurred adjacent to the Roosevelt geothermal area during the summer of 1981. From June 27 to August 28, 1044 microearthquakes (M/sub L/ $\leq$ 1.5) were recorded from which 686 earthquakes were located and analysed. The main cluster of microearthquakes was located about 2 km east of the production field at a depth of about 5 km. A few small events were located in the production field at shallow depths (< 2 km). Three of the four largest earthquakes in the swarm (M/sub L/ 1.5-2.0) were located 4 to 5 km further east along a n-NW trend beneath the flank of the adjacent Mineral Mountains. Focal mechanism solutions indicate primarily normal faulting due to the regional E-W extension which characterizes this portion of the eastern Basin and Range province. Hence, the Mineral Mountain swarm appears to be a natural release of tectonic stress in this area. Nevertheless, the occurrence of natural earthquake swarms indicates a potential for induced seismicity at Roosevelt Hot Springs after major production operations are initiated.

23371 **(EUR—7718-FR) Determination du flux geothermique en France (Determination of the geothermal heat flow in France).** (Commission of the European Communities, Luxembourg). [nd]. 125p. NTIS, PC E06/MF E06.

A campaign for heat flow measurement in France was carried out in order to obtain the general pattern of heat flow over the whole territory. New data were obtained either from industrial boreholes (oil or mining exploration) or from boreholes specially drilled for geothermal exploration. Using these new data, a general synthesis of the measurements of heat flow was compiled and a critical comparison of variations made. The existence of high values over the Massif Central and the Eastern part of the country is noteworthy. However, complementary measurements are still required in some areas where existing data are insufficient or inconsistent.

23372 **(LA—9671-HDR) Analysis and thermal-design improvements of downhole tools for use in hot-dry wells.** Bennett, G.A.; Sherman, G.R. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 23p. NTIS, PC A02/MF A01. Order Number DE83009271.

Design improvements made for downhole thermal protection of systems based on results obtained from the analysis of the electronics, heat sink, and dewar packaged in a steel tubular body are described. Results include heat flux at the tool surface, temperature-time histories of each subsystem and isotherm contour plots during the simulation. The analysis showed that the thermal potential between the electronics and the heat sink was in the wrong direction and also was too small to remove heat entering the electronics section. Also, the conductance of the available heat transfer paths from electronics to heat sink was too small to remove that heat efficiently. Significant improvements in survival at high temperatures were achieved by increasing the available thermal capacity of the heat sink, increasing the thermal potential between the heat sink and electronics, and vastly increasing the conductance of the heat transfer paths.

23373 **(LBL—11499) Development of an instrument to measure the concentration of noncondensable gases in geothermal discharges. Final report, October 1, 1978-September 30, 1979.** Blair, C.K.; Harrison, R.F. (Terra Tek, Inc., Salt Lake City, UT (USA)). Jan 1980. Contract W-7405-ENG-48. 74p. (GREMP—13). NTIS, PC A04/MF A01. Order Number DE83009150.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Reported herein is a summary of a project to design, construct, and test a device which will continuously measure the vapor phase concentration of noncendensable gases in saturated steam/water geothermal discharges. Descriptions of the design, operating procedures, measurement accuracy, and limitations of the device are included. Also presented are results of laboratory testing and of field demonstration of the instrument. Recommendations for further refinement and development of the apparatus are discussed.

23374 **(PB—83-133835) Seismische studien zur bestimmung der krustenstruktur im bereich der geothermischen anomalie der toskana (seismic studies for defining the structure of the crust within the area of the geothermal anomaly of tuscany). Final report.** Giese, P.; Wigger, P.; Morelli, C.; Nicolich, R. (Commission of the European Communities, Luxembourg). [nd]. 116p. NTIS, PC E06/MF E06.

A geothermal structure model for the geothermal anomaly of Tuscany was constructed from the results of measurements of the velocity of seismic propagation, made during 1978 to 1980. The existence of three zones was deduced having various thicknesses, geological formations, temperatures and temperature gradients; thermal water was found in the uppermost zone. Electrical resistivity data, obtained from magnetotelluric measurements of the area were used to support the temperature model. This is seen as having a back-arc structure with a rather thin continental crust. The report includes details of the geology and orogenesis of the area, of the seismic shots, the measurements and their evaluation in the form of profiles, as well as of raytracing and gravimetry.

1504 Legal And Institutional Aspects

23375 **(DOE/IG—112) Five-megawatt geothermal-power pilot-plant project.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 29 Aug 1980. 74p. TIC. Order Number DE83006311.

Report to the Secretary, Deputy Secretary.

This is a report on the Raft River Geothermal-Power Pilot-Plant Project (Geothermal Plant), located near Malta, Idaho; the review took place between July 20 and July 27, 1979. The Geothermal Plant is part of the Department of Energy's (DOE) overall effort to help commercialize the operation of electric power plants using geothermal energy sources. Numerous reasons were found to commend management for its achievements on the project. Some of these are highlighted, including: (a) a well-qualified and professional management team; (b) effective cost control, performance, and project scheduling; and (c) an effective and efficient quality-assurance program. Problem areas delineated, along with recommendations for solution, include: (1) project planning; (2) facility design; (3) facility construction costs; (4) geothermal resource; (5) drilling program; (6) two facility construction safety hazards; and (7) health and safety program. Appendices include comments from the Assistant Secretary for Resource Applications, the Controller, and the Acting Deputy Director, Procurement and Contracts Management.

1505 Economic And Financial Aspects

REFER ALSO TO CITATION(S) 23385

23376 **(NASA-CR—168757) Geothermal probabilistic cost study.** Orren, L.H.; Ziman, G.M.; Jones, S.C.; Lee, T.K. (Jet Propulsion Lab., Pasadena, CA (USA)). Aug 1981. 196p. NTIS, PC A09/MF A01.

A tool is presented to quantify the risks of geothermal projects, the Geothermal Probabilistic Cost Model (GPCM). The GPCM model was used to evaluate a geothermal reservoir for a binary-cycle electric plant at Heber, California. Three institutional aspects of the geothermal risk which can shift the risk among different agents was analyzed. The leasing of geothermal land, contracting between the producer and the user of the geothermal heat, and insurance against faulty performance were examined.

1507 By-products

REFER ALSO TO CITATION(S) 23075

1509 Geothermal Engineering

23377 **(ANL/NESC—973) SWIFT; waste-isolation flow & transport model.** Cranwell, R.M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048973.

On the CDC7600 in direct solution mode, the maximum number of grid blocks allowed is approximately 1400.

SWIFT solves the coupled or individual equations governing fluid flow, heat transport, brine displacement, and radionuclide displacement in geologic media. Fluid flow may be transient or steady-state. One, two, or three dimensions are available and transport of radionuclides chains is possible.CDC7600; FORTRAN IV; SCOPE 2.1; 70,000 (octal) words of memory are required to compile the SWIFT source. 130,000 (octal) words of small core memory (SCM) and 400,000 (octal) words of large core memory (LCM) are needed to execute the sample problems. SWIFT is designed to permit the user to adjust the machine requirements to problem complexity..

23378 **(ANL/NESC—976) GCFM5.0; geothermal field & power plant costs.** Blake, J.C. (Mitre Corp., McLean, VA (USA). METREK Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048976.

Maxima of - 50 years project life (construction and operation) 50 years loan life 15 financial cases 10 power plant designs 10 field designs GCFM does not contain provisions for estimating the costs of geothermal direct heat utilization projects.

GCFM (Geothermal Loan Guaranty Cash Flow Model) is an interactive program which estimates project costs and cash flows for geothermal producer field projects and geothermal electric plant projects during construction and operation. Both the year-by-year cash flow for a project and a levelized busbar cost of electricity or a levelized price for geothermal fluid can be estimated.IBM370,303x; FORTRAN IV; VM/CMS; 750K bytes of memory are required for execution of the program..

23379 **(ANL/NESC—977) SECTION.REV1; plot geochemical drill hole data.** Withrow, C. (Utah Univ., Salt Lake City (USA). Earth Science Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048977.

Maxima of - 700 samples in a problem area 805 records on the merge file 207 records on the data file The program is limited to the straight-line model of a drill hole.

SECTION, which consists of two interactive programs, SEC-IO and SEC-PLOT, provides plots of core sample geochemical data for any or all drill holes in a given area projected onto any predetermined section plane. Plot size is user-defined by keyboard input. Holes are plotted in cross section as straight lines defined by collar coordinates, bearing angle, dip angle, and length. SECTION is applicable to small problem areas with relatively short drill holes that are approximately straight. The data for one problem area may be saved and another retrieved, all within program control.UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%); EXEC8; SEC-IO and SEC-PLOT require 12,000 and 9,000 words of memory, respectively. SEC-IO requires a work file (unit 1) and a merge file (unit 2) on a direct-access device. SEC-PLOT requires only the work file..

23380 (DOE/OR/00099—T1) City of North Bonneville, Washington: Geothermal Exploration Project, production test well, Phase II. Final report. (Kent Associates, Lake Oswego, OR (USA)). Jun 1982. Contract FG07-80R000099. 494p. NTIS MF A01. Order Number DE83008984.

Microfiche only, copy does not permit paper copy reproduction.

Based on discussions with the City of North Bonneville, the production test well was drilled to a depth that would also explore for ground water temperatures near 130°F (54.4°C). Depth projections to a 130°F bottom hole temperature were made by assuming a constant ground water temperature rise greater than 50°C per kilometer, and by assuming that essentially homogeneous or equivalent conductive rock units would be encountered. Minimum water production requirements were not set, although the City determined that about 800 gpm would be acceptable. Large upper casing diameters of 16 and 12 inches were installed in order to provide the future use of either a vertical turbine or submersible pump, as desired by the city. The scope of work included interpretation of well characteristics, evaluation of ground water as a geothermal resource, geologic analysis of data from drilling and testing, drilling supervision, daily drilling cost accounting, and preparation of a final report. The report includes geologic evaluation of the drilling and test data, ground water and geothermal potential.

23381 (EGG-GTH—6143) Raft river geothermal pump disassembly and inspection. Van Treeck, R. (EG and G Idaho, Inc., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 18p. NTIS, PC A02/MF A01. Order Number DE83009202.

The disassembly and postoperation inspection of the Peerless geothermal water pump used in teh RRGE-1 well at the Raft River Geothermal Test Site are summarized. Disassembly was hampered by scale that froze some of the pump bearings onto the impeller shaft after operation ceased. The pump appeared otherwise in generally excellent condition after more than 1600 h running time in a geothermal environment. Most postoperation diameters of rotating parts were still within factory tolerance. The few out-of-tolerance bearing diameters could not be attributed to wear and could have been out of tolerance when received. This possibility points to a need for preoperation quality-control inspection of the bearings.

23382 (SAND—82-0899C) Quasi-steady model for predicting temperature of aqueous foams circulating in geothermal wellbores. Blackwell, B.F.; Ortega, A. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 41p. (CONF-830301—7). NTIS MF A01. Order Number DE83005191.

From ASME-JSME thermal engineering joint conference; Honolulu, HI, USA (20 Mar 1983).

Microfiche only, copy does not permit paper copy reproduction.

A quasi-steady model has been developed for predicting the temperature profiles of aqueous foams circulating in geothermal wellbores. The model assumes steady one-dimensional incompressible flow in the wellbore; heat transfer by conduction from the geologic formation to the foam is one-dimensional radially and time-dependent. The vertical temperature distribution in the undisturbed geologic formation is assumed to be composed of two linear segments. For constant values of the convective heat-transfer coefficient, a closed-form analytical solution is obtained. It is demonstrated that the Prandtl number of aqueous foams is large (1000 to 5000); hence, a fully developed temperature profile may not exist for representative drilling applications. Existing convective heat-transfer-coefficient solutions are adapted to aqueous foams. The simplified quasi-steady model is successfully compared with a more-sophisticated finite-difference computer code. Sample temperature-profile calculations are presented for representative values of the primary parameters. For a 5000-ft wellbore with a bottom hole temperature of 375°F, the maximum foam temperature can be as high as 300°F.

23383 (SAND—82-7203) Development of modifications for Coflexip flexible drilling pipe for high-temperature and -pressure geothermal service. Final report. Friese, G.J. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 55p. NTIS, PC A04/MF A01. Order Number DE83009393.

Coflexip (France) flexible drilling pipe can provide economies in drilling geothermal wells. However, the current liner materials cannot take the high temperatures (~250C) and pressures (~69 MPa). Development was undertaken to replace the liner with higher temperature materials and, thus increase the temperature capability of the flexible pipe. DuPont Teflon PFA 350, L'Garde EPDM Y267 and L'Garde AFLAS 291 were considered but they all require backing by a closely woven stainless steel fabric to prevent extrusion. A graphite-reinforced EPDM elastomer was developed which has the potential of meeting the pressure-temperature requirements without the metal fabric reinforcement.

1510 Direct Energy Utilization

REFER ALSO TO CITATION(S) 23663

23384 (ANL/NESC—835) GEOCITY; geothermal district heating economics. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Schulte, S.C. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048835.

Current array dimensions provide for a maximum well-field size of 625 wells and maximum operating period of 50 years from reservoir exploration through the economic life of the district heating system. Reference report, PNL-2742.

GEOCITY is a large-scale simulation model which combines both engineering and economic submodels to systematically calculate the cost of geothermal district heating systems for space heating, hot-water heating, and process heating based upon hydrothermal geothermal resources. The GEOCITY program simulates the entire production, distribution, and waste disposal process for geothermal district heating systems, but does not include the cost of radiators, convectors, or other in-house heating systems. GEOCITY calculates the cost of district heating based on the climate, population, and heat demand of the district; characteristics of the geothermal resource and distance from the distribution center; well-drilling costs; design of the distribution system; tax rates; and financial conditions.CDC CYBER74;CDC6600,7600; FORTRAN IV; SCOPE 3.4.2 (CYBER74); At least 54K (decimal) words of memory are required. 104,000 (octal) words of program storage were used for execution of the sample problem on a CDC7600 and 137,000 (octal) words were used on a CDC6600.

23385 (EUR—7801-EN) Geothermal heating. Aureille, M. (Commission of the European Communities, Luxembourg). [nd]. 98p. NTIS, PC E05/MF E05.

The aim of the study is to demonstrate the viability of geothermal heating projects in energy and economic terms and to provide nomograms from which an initial estimate may be made without having to use data-processing facilities. The effect of flow rate and temperature of the geothermal water on drilling and on the network, and the effect of climate on the type of housing are considered.

23386 Design of the Klamath Falls geothermal district heating network. Lienau, P.J. (Oreg Inst of Technol, Klamath Falls, USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* 87: 797-994(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

Aspects of the geothermal district heating for the city of Klamath Falls, Oregon, now under construction, are discussed: geology and hydrology of the geothermal system; boundaries of the pumping districts for the geothermal distribution system; district

network design; production well pumps; heat exchangers; controls; and economic analysis. 9 refs.

23387 **Design of a geothermal district heating system for Boise, Idaho.** Little, N.E.; Austin, J.C.; Bissell, R.R. (CH2M Hill Inc, Boise, Idaho, USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **87**: 1005-1014(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

The preliminary design for a Boise geothermal district heating system indicates that the system is technically economically feasible. Vertical turbine well-head pumps will pump geothermal water directly to the end users through a transmission pipeline. System flow rates will be controlled from system pressure by using multiple pumps and throttling valves. A collection pipeline will transport the geothermal water from the end users' systems to a discharge point on the Boise River. 13 refs.

16 Tidal Power

REFER ALSO TO CITATION(S) 23246

17 WIND ENERGY

REFER ALSO TO CITATION(S) 23246, 23762

1701 Availability (climatology)

23388 **(DOE/ET/20316—81-1) Remote sensing for wind power potential: a prospector's handbook.** Wade, J.E.; Maule, P.A.; Bodvarsson, G.; Rosenfeld, C.L.; Woolley, S.G.; McClenahan, M.R. (Oregon State Univ., Corvallis (USA)). Feb 1983. Contract AT06-76ET20316. 321p. (PNL—3938). NTIS, PC A14/MF A01. Order Number DE83007037.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Remote sensing can aid in identifying and locating indicators of wind power potential from the terrestrial, marine, and atmospheric environments (i.e.: wind-deformed trees, white caps, and areas of thermal flux). It is not considered as a tool for determining wind power potential. A wide variety of remotely sensed evidence is described in terms of the scale at which evidence of wind power can be identified, and the appropriate remote sensors for finding such evidence. Remote sensing can be used for regional area prospecting using small-scale imagery. The information from such small-scale imagery is most often qualitative, and if it is transitory, examination of a number of images to verify presistence of the feature may be required. However, this evidence will allow rapid screening of a large area. Medium-scale imagery provides a better picture of the evidence obtained from small-scale imagery. At this level it is best to use existing imagery. Criteria relating to land use, accessibility, and proximity of candidate sites to nearby transmission lines can also be effectively evaluated from medium-scale imagery. Large-scale imagery provides the most quantitative evidence of the strength of wind. Wind-deformed trees can be identified at a large number of sites using only a few hours in locally chartered aircraft. A handheld 35mm camera can adequately document any evidence of wind. Three case studies that employ remote sensing prospecting techniques are described. Based on remotely sensed evidence, the wind power potential in three geographically and climatically diverse areas of the United States is estimated, and the estimates are compared to actual wind data in those regions. In addition, the cost of each survey is discussed. The results indicate that remote sensing for wind power potential is a quick, cost effective, and fairly reliable method for screening large areas for wind power potential.

23389 **(NYSERDA—82-31) Wind-resource monitoring at Southtowns Sewage Treatment Plant, Woodlawn, NY.** (WTG Energy Systems, Inc., Buffalo, NY (USA)). Jun 1982. 67p. NYSERDA, Two Rockefeller Plaza, Albany, NY 12223. Order Number DE83901506.

Wind monitoring equipment was installed on an 80-foot meteorological tower at the southtowns Sewage Treatment Plant site in Woodlawn, New York, near the shoreline of Lake Erie. The purpose of the sutdy was to record wind velocity and direction for one year and calculate the annual kilowatt-hour output for a proposed 200 kW wind turbine generator. Data were summarized and compared to records taken concurrently at both the United States Coast Guard base located six miles north of the Southtowns site, and from the Buffalo Airport located 12 miles to the northeast. Coast Guard data were used to supplement missing data from the sutdy site and to establish a correlation for future use of Coast Guard data for siting a wind turbine in the Buffalo area. Concurrent and long-term data from the Buffalo Airport were used primarily to determine if the wind speeds recorded during the study were representative of an average year and to adjust the study site data accordingly. An output in annual kilowatt-hours was calculated for the proposed generator based on its operational characteristics.

1704 Economics

REFER ALSO TO CITATION(S) 23252

23390 **(DOE/ET/23119—T1) Commercialization analysis of large wind energy conversion systems. Final report.** Boyd, D.W.; Buckley, O.E.; Haas, S.M. (Decision Focus, Inc., Palo Alto, CA (USA)). Jun 1980. Contract AC03-79ET23119. 311p. NTIS, PC A14/MF A01. Order Number DE83009258.

Portions are illegible in microfiche products.

The framework is described that can be used to evaluate potential new federal incentives to facilitate the market acceptance of utility-scale wind energy conversion systems. The insights gained from utilizing this framework to evaluate a variety of hypothetical federal incentives are discussed. The heart of the evaluation framework is an explicit representation of the decisions made by utility purchasers, suppliers, and government agencies with respect to the utilization and fabrication of large wind energy conversion systems. The demand-side and supply-side aspects of the multiparty commercialization model are described, and the model's struture is explained. (LEW)

23391 **(EPRI-AP—2882) Assessment of distributed wind-power systems. Final report.** Kaupang, B.M. (General Electric Co., Schenectady, NY (USA). Electric Utility Systems Engineering Dept.). Feb 1983. 354p. NTIS, PC A16/MF A01. Order Number DE83901872.

A utility-oriented methodology for the purpose of evaluating distributed wind-power systems was developed and tested, utilizing data from three actual utility systems. Conventional utility planning techniques were used, including loss-of-load probability and production-cost-simulation methods in the generation planning area, transmission and distribution (T & D) system expansion models, and loss calculations. Evaluations were based on comparison of total utility-system cost with an without wind-power plants, and wre expressed in terms of wind-power-plant value and cost. Value is measured by the worth of displaced energy and capacity of conventional power plants, of T & D equipmen deferrals, and of T & D loss savings. Cost consists of he capital, and operating and maintenace costs of the wind-power plants. The value of distributed wind-power generation was found to be dominated by the generation energy and capacity value, as opposed to T & D system impacts. The energy value alone did, in two of the three utilities studied, result in a favorable value/cost relationship for the cost assumptions that were used. The problem of voltage fluctuation on distribution feeders from wind turbines due to wind gusts was studied for several sites. In most relaistic applications, the voltage fluctuations would not be a limiting criterion for practical wind-turbine penetration levels. If the wind turbine is connected to the distributionfeeder through a rectifier-inverter, voltage fluctuations become a negligible factor. However, reactive-power compensation of the inverter would most likely be required for this application.

23392 **(EPRI-AP—2882-SY) Assessment of distributed wind-power systems.** Kaupang, B.M. (General Electric Co., Schenectady, NY (USA). Electric Utility Systems Engineering Dept.). Feb 1983. 55p. NTIS, PC A04/MF A01. Order Number DE83901865.

A utility-oriented methodology, for the purpose of evaluating distributed wind power systems, was developed and tested utilizing data from three actual utility systems. Conventional utility planning techniques were used including loss-of-load probability and production cost simulation methods in the generation planning area, transmission and distribution (T & D) system expansion models, and loss calculations. In addition, a recently developed load supplying capability (LSC) model was used to assess impacts of distributed generation on the transmission system's ability to serve the load. Evaluations were based on comparison of total utility system costs, with and without wind plants, and were expressed in terms of wind power plant value and cost. Value is measured by the worth of displaced energy and capacity of conventional power plants, of T & D equipment deferrals, and of T & D loss savings. Cost consists of capital costs and operating and maintenance costs of the wind power plants. The value of distributed wind power generation was found to be dominated by the generation energy and capacity value, as opposed to T & D system impacts. The problem of voltage fluctuation on distribution feeders from wind turbines due to wind gusts was studied for several sites. Both directly connected synchronous generators and rectifier-inverter connected wind turbines were analyzed. In most realistic applications, the voltage fluctuations would not be a limiting criterion for practical wind turbine penetration levels. If a wind turbine is connected to the distribution feeder through a rectifier-inverter, voltage fluctuations become a negligible factor. However, reactive power compensation of the inverter would most likely be required for this concept.

1706 Wind Energy Engineering

REFER ALSO TO CITATION(S) 23388

23393 **(CONF-820134—1) Assessment of load-frequency-control impacts caused by small wind turbines.** Curtice, D.H.; Reddoch, T.W. (Oak Ridge National Lab., TN (USA); Systems Control, Inc., Palo Alto, CA (USA)). 1982. Contract W-7405-ENG-26. 11p. NTIS, PC A02. Order Number DE82011513.

From IEEE Power Engineering Society winter meeting; New York, NY, USA (30 Jan 1982).

Paper copy only, copy does not permit microfiche production.

A method is presented to analyze the effects small wind turbines' (WTs) output may have on the load frequency control process. A simulation model of a utility's automatic generation control (AGC) process is used with recorded real-time system load data modified by synthesized data characterizing the aggregate output of small WTs. A series of WT output scenarios are defined for various WT penetrations of the total system load. WT output scenarios, varying in frequency and magnitude, are combined with system load variations to test the effectiveness of present AGC control strategies. System performance change from the base case is assessed using area control error (ACE) values, time between zero crossings, inadvertent accumulation, and control pulses sent to regulating units.

23394 **(PNL—4318) Learning to forecast wind at remote sites for wind-energy applications. Final report.** Notis, C.; Trettel, D.W.; Aquino, J.T.; Piazza, T.R.; Taylor, L.E.; Trask, D.C.; Wegley, H.L.; Miller, A.H. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 239p. NTIS, PC A11/MF A01. Order Number DE83008756.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Observed wind patterns are correlated with synoptic or mesoscale weather systems. Six sites selected for analysis include Montauk Point, New York; Boone, North Carolina; Ludington, Michigan; Clayton, New Mexico; Amarillo, Texas; and San Gorgonio Pass, California. Objectives of the analysis are: to identify synoptic and/or mesoscale weather patterns that are associated with recognizable wind events at the sites; to define a set of criteria that uniquely describes such weather patterns; to estimate the reliability (accuracy) of forecasting rules derived from the association of weather patterns and site winds; and to attempt to separate any mesoscale effects of local topography from the synoptic-scale effects. One-to-one mapping of wind regimes onto synoptic types was not found. It was concluded that four factors should be examined when stratifying wind regimes: synoptic situation, descriptive climatology, pressure gradient vector, and winds aloft. The wind forecasting approach developed was intended for forecasting hourly average winds out to the 24 hour or possibly 36 hour time horizon. (LEW)

23395 **(RFP—3032/1) McDonnell 40-kW Giromill wind system: Phase I. Design and analysis. Volume I. Executive summary.** Anderson, J.W.; Brulle, R.V.; Birchfield, E.B.; Duwe, W.D. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant; McDonnell Aircraft Co., St. Louis, MO (USA)). Aug 1979. Contract AC04-76DP03533. 18p. NTIS, PC A02. Order Number DE82011535.

Paper copy only, copy does not permit microfiche production. Original copy available until stock is exhausted.

The objective of Phase I of this contract was to determine a preferred configuration for the 40-kW Giromill and to design that configuration. The Giromill is a vertical axis windmill with a series of articulated vertical blades whose angles are controlled to maintain a constant RPM (when wind speed is sufficient). A microprocessor is used to process information on wind speed, wind direction, and RPM and establish blade position. The prototype Giromill, when connected to a utility grid, is designed to supply 40-kW in a 20 mph wind. By means of a kit, it can be converted to a stand-alone machine having a mechanical output. A 30-year life was a design objective. The Giromill is designed to withstand a peak gust of 125 mph with a 1.5 safety factor. Phase I consisted first of a four-month period of trade studies during which a number of variations in the design were studied. Out of these studies evolved the configuration which became the basis for a six-month design period, which began during the last month of the trade-off period. Additional tasks performed during design were a Failure Mode and Effect Analysis, Preparation of a Test Plan, Definition of Test Instrumentation, and a Preliminary Production System Cost Analysis.

23396 **(SAND—82-7211) Wind-energy battery-storage project. Phase I. Final report.** Neill, D.R.; Curtis, G.D. (Sandia National Labs., Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. 100p. NTIS, PC A05/MF A01. Order Number DE83009389.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A program is described involving data collection, development of a computer model, and use of the data in the model to simulate use of the WEBS in a specific locality. The data collection involved hourly wind samples, load data, and performance and cost information on candidate equipment. The model enables the user to call these data from files, configure the system, and obtain performance measures and operational statistics. Comparative economic analyses on probable configurations indicated that an array of wind machines would be cost-effective but that battery storage would be economically marginal unless it can interact usefully with the utility. Batteries do however contribute to better system operation. Recommendations are made for a modification of the model to address utility concerns, further refinement/optimization of a configuration, and preliminary design work.

20 ELECTRIC POWER ENGINEERING

2001 Power Plants And Power Generation

REFER ALSO TO CITATION(S) 22909, 22912, 22995, 23659, 23663, 23664, 23702, 23731, 23732, 23733, 23734, 23735, 23736, 23737, 23738, 23739, 23741, 23767, 23769, 23771, 23772, 23772, 23877

23397 **(AD-A—121033/5) Development of a quiet Stirling cycle multi-fuel engine for electric power generation. Final report Feb-Aug 82.** Mercer, J.E.; Emigh, S.G.; Riggle, P.; Tremoulet, O.L.; White, M.A. (Flow Industries, Inc., Kent, WA (USA)). Aug 1982. 45p. (RTD—242). NTIS, PC A03/MF A01.

The work described in this report summarizes a six-month study to develop a lightweight, tactical electric power plant with a low level of aural, I. R., and visual detectability, based on a Stirling engine. The conceptual design presented was analyzed and predicted to have power output qualities exceeding those specified by the Army for tactical generators. The unit promises to have maintenance and overhaul requirement characteristics superior to any generator system in current use.

23398 **(ANL/NESC—833) BECKDRY; dry cooling for steam-electric plants.** Mitchell, R.D. (Beck (R.W.) and Associates, Denver, CO (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048833.

As written, BECKDRY encompasses tower sizes from 26F to 84F ITD and will simultaneously evaluate the dry-cooling system for up to three unit fuel costs and three annual fixed-charge rates. A maximum of three operating load conditions is permitted in modeling the generating unit operating profile. Reference report, ERDA-74.

BECKDRY designs and determines the cost of components of an indirect dry-type cooling system for a large steam-electric generating plant for a given range of design criteria. The annual performance and costs and relative bus-bar energy production costs for specified operating and economic conditions for each design are evaluated and the economically optimum design, based on minimum bus-bar costs, is determined. The program is applicable to fossil-fueled or nuclear plants equipped with mechanical-draft or natural-draft dry cooling systems utilizing direct-contact, single-pressure surface or two-zone multipressure surface condensers. A turbine generator of conventional design, such as used for evaporative-cooled plants, or a unit designed especially for high-exhaust-pressure operation may be used with the dry-cooling system.CDC6600,7600; FORTRAN IV; SCOPE; 26,432 words of memory are required for execution.

23399 **(ANL/NESC—837) DRIFT; cooling tower drift eliminator analysis.** Golay, M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048837.

The maximum number of nodes for the input velocity distribution is 60. Reference report, MIT-EL 77-006.

DRIFT simulates the performance of standard industrial evaporative cooling tower drift eliminators. The droplet trajectory within eliminators as well as the capture efficiency of the eliminators are calculated. Standard eliminator geometries included are the single-layer louvre, double-layer louvre, sinus-shaped, Hi-V, and asbestos-cement. Other geometries can be evaluated if the user provides the appropriate boundary information in the relevant routines.IBM370,303x; FORTRAN IV; OS/370; 190K bytes of memory are required to execute the program; additional memory is required if plotting is desired.

23400 **(ANL/NESC—842) SUPAN; analysis of beam-type piping supports.** Nitzel, M.E. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048842.

Maxima of 100 supports, 10 material property sets, 20 cross sectional geometry sets, 25 separate load cases, 25 combined load sets. Reference report, RE-A-79-051.

Piping supports of many types and sizes are necessary to ensure the structural integrity of power plant piping systems. For situations where standard vendor items may not be adequate or economical, beam-type piping supports are often useful. Such supports may be fabricated from bar stock, I-sections, pipes, or beams of other cross sectional geometries. The SUPAN program was developed to facilitate ASME code analysis of a large number of supports subjected to multiple loading conditions. Allowable member cross section types are--solid rectangular, American Institute of Steel construction W, M, S, and HP shapes, solid round, solid square, and pipe. A maximum of 25 separate load cases may be specified. Five of these may then be combined to form each of the combined load sets used in the analysis. Alternate signs of response spectrum load sets are considered and service condition stress limit multiplication factors are determined when the combined load sets are formed.CDC7600; FORTRAN IV; SCOPE 2; 15,000 (octal) words of small core memory (SCM) and 372,000 (octal) words of large core memory (LCM) are used.

23401 **(ANL/NESC—957) PICES; utility static generation reliability.** Greene, S.R. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048957.

Maxima of - 1000 system reserve margin states 301 generating units 20 years of simulated operation 5 generating units added or retired per year Plant maintenance requirements must be specified as integer weeks, and generating units are represented by either two- or three-state models. Changes in load cycle shape are not accommodated within the code; the new year's load record is derived from multiplying the annual hourly load value by the annual growth factor.

PICES (Probabilistic Investigation of Capacity and Energy Shortages) was developed for estimating an electric utility's expected frequency and duration of capacity deficiencies on a daily on- and off-peak basis. In addition to the system loss-of-load probability (LOLP) and loss-of-load expectation (LOLE) indices, PICES calculates the expected frequency and duration of system capacity deficiencies and the probability, expectation, and expected frequency and duration of a range of system reserve margin states. Results are aggregated and printed on a weekly, monthly, or annual basis. The program employs hourly load data and either the two-state (on/off) or a more sophisticated three-state (on/partially on/fully off) generating unit representation. Unit maintenance schedules are determined on a weekly, levelized reserve margin basis. In addition to the 8760-hour annual load record, the user provides the following information for each unit: plant capacity, annual maintenance requirement, two- or three-state unit failure and repair rates, and for three-state models, the partial state capacity deficiency. PICES can also supply default failure and repair rate values, based on the Edison Electric Institute's 1979 "Report on Equipment Availability for the Ten-Year Period 1968 Through 1977", for many common plant types. Multi-year analysis can be performed by specifying as input data the annual peak load growth rates and plant addition and retirement schedules for each year in the study.IBM303x,360,370; FORTRAN IV; OS/MVT or OS/MVS; 480K bytes of memory are required for execution..

23402 **(ANL/NESC—958) STOPS; power system short-term optimization.** Kuliasha, M.A. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048958.

The model does not attempt to determine the overall economics of load control systems, which must also include consideration of capital investments in generation, transmission, distribution, and load control facilities. However, it does calculate production cost savings and produce the modified system profiles necessary to determine capital investments. Each unit input must be available for the entire time period. STOPS can perform a weekly optimization using hourly loads for a power system of up to 60 generating units.

STOPS (Short-Term Optimization of Power Systems) is a unit commitment/economic dispatch model developed to determine how a power system with an active load control system should be operated to make the best use of its available resources. The model considers the generation mix, individual unit characteristics and constraints, production costs, system security requirements, the load profile, and the unique characteristics and operational limitations of the load control system. STOPS is capable of handling all types of conventional generating sources including thermal, hydroelectrical, and pumped storage units and most appliances for direct control including those with inherent or designed storage characteristics. In addition to the optimal load control operating strategy, hourly production costs, system marginal costs, spinning reserve, and fuel usage are calculated.IBM303x,360,370; FORTRAN IV; OS/MVT or OS/MVS; 280K bytes of memory are required for execution..

23403 (ANL/NESC—960) PRODCOST; utility generating cost simulation. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Smolen, G.R. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048960.

Maxima of - 200 plants 1 hydroelectric plant 1 pumped storage plant 5 separate firm purchases 5 firm sales.

PRODCOST simulates the operation of an electric utility generation system. Through a probabilistic simulation the expected energy production, fuel consumption, and cost of operation for each unit in the system are determined. Total system fuel consumption, energy generation by type, total generation costs, as well as system loss of load probability and expected unserved energy are calculated. The code does not take into account the transmission and distribution system of the utility. It assumes that there are no transmission limitations within the system. Finite energy exchanges with neighboring utilities can be modeled.IBM360,370,303x; FORTRAN IV (97%) and Assembler (3%); OS/370; 300K bytes of memory are required for execution..

23404 (ANL/NESC—965) BICYCLE; levelized life cycle cost calculation. Hardie, R.W. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048965.

With current program dimensioning, 12(the number of years a plant operates)+(the number of years for capital construction) must be less than 1000.

BICYCLE calculates levelized life-cycle costs for plants that produce electricity, heat, gaseous fuels, or liquid fuels. BICYCLE also gives a detailed breakdown of the various life-cycle components making up the total and yearly cash flows in current dollars during each year of the project's lifetime.CDC6600,CYBER175; FORTRAN IV; NOS 1.4 (CDC CYBER175); 23,000 (octal) words are required to execute the sample problems..

23405 (ANL/NESC—969) RATEPAC; power plant revenue requirements code. Fuller, L.C. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048969.

RATEPAC is designed to provide a rapid means of estimating revenue requirements, cash flows, taxes, etc. It should be used only as an estimating tool for selection between alternatives or to justify more detailed studies. Simplifications have been made for speed of calculation and ease of use. Property tax is assumed to be constant over the plant lifetime.

RATEPAC models the financial aspects of an electric power plant or other investment requiring capital outlays and having annual operating expenses. The program produces incremental proforma financial statements showing how an investment will affect the overall financial statements of a business entity. The code accepts parameters required to determine capital investment and expense as a function of time and sums these to determine minimum revenue requirements (cost of service). The program also calculates present worth of revenue requirements and required return on rate base.IBM303x,360,370; FORTRAN IV; OS/MVT or OS/MVS; 140K bytes of memory are required for execution..

23406 (ANL/NESC—971) ICOP; financial model industrial cogeneration. Green, L.M.; Burnworth, H.F. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048971.

Maxima of - 40 construction periods 40 years of operation A variety of depreciation schemes can be defined, including those associated with the Economic Recovery Tax.

The ICOP program performs financial analysis computations in a generic fashion, with special emphasis on the analysis of industrial cogeneration applications. Both undiscounted and discounted cash flows are generated. Measures of financial feasibility include energy savings, internal rate of return, and net present value.CDC CYBER170,175; FORTRAN IV; MACE, the TRW-modified KRONOS Operating System (CDC CYBER170), NOS 1.4 (CDC CYBER175); Approximately 45,000 (octal) words of CDC CYBER175 memory are used to execute the program..

23407 (BMFT-FB-T—79-91) Directionally solidified eutectic superalloys for stationary gas turbines. Sahm, P.R.; Hildebrandt, U.W. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 186p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83750316.

Portions are illegible in microfiche products.

The best presently available high temperature alloys (approx. 45 N/mm² at 1000°C) do not fulfill the requirements of modern stationary gas turbines. Aim of the R and D project was to develop a stronger material on the basis of Co-Cr_7C_3 in directionally solidified eutectics. Other critical properties, in particular high temperature oxidation and corrosion stability, had to be improved as well. By alloy and coatings development it was possible to raise mechanical strength by up to 40% (at 1000°C) and more than double creep rupture times (1000°C) compared with the basic Co-Cr_7C_3 eutectic. Cyclic mechanical strength and ductility were also improved. Better stability against high temperature oxidation and corrosion was obtained not only through alloying, but also by applying Si-enriched coatings. The next essential step will now have to be the procurement of the necessary precision casting technology.

23408 (CONF-8104192—2) Batteries for load leveling. Nelson, P.A.; Webster, W.H.; Shimotake, H. (Argonne National Lab., IL (USA); USDOE, Washington, DC). 1981. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83007752.

From Forum on fuel cell and secondary batteries for load leveling; Tokyo, Japan (13 Apr 1981).

Batteries for storing energy in electric utility networks are under development in the US in programs funded by the Department of Energy and the Electric Power Research Institute. The most difficult requirements for these applications are long cycle life (greater than 2000 cycles) with deep discharges and low cost ($50 to $100/kWh). Steady progress is being made in developing advanced batteries, including the zinc/halogen batteries, high-temperature batteries, and flow-cell batteries. Advanced lead-acid batteries, which are also under development, will have large cells, long life, and replaceable positive electrodes and are expected to be economically competitive with the advanced batteries during the introductory period and perhaps longer.

23409 (CONF-8104197—1) Advanced intake technology for cooling-water intakes: current status and future direction. Sharma, R.K.; Fritz, E.S.; Murarka, I.P. (Argonne National Lab., IL (USA); National Power Plant Team, Ann Arbor, MI (USA); Electric Power Research Inst., Palo Alto, CA (USA)). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008652.

From NRC workshop on advanced intake technology; San Diego, CA, USA (22 Apr 1981).

A synthesis of a meeting on research and developments related to cooling water intake structures and a critical analysis of the current status of the screening technology are presented. Among the conclusions and recommendations of this workshop were the following: there is a very definite shift towards fine mesh screening for the protection of larval forms; because of the biological variability and site related factors, a single screening technology cannot be expected to solve entrainment/impingement problems at all sites; variations are highly likely in the degree of success in safely screening organisms under laboratory conditions or in prototype and full scale testing, therefore tests conducted under field conditions should have more weight than lab tests in final decision making; selection of the intake design should be based on a comprehensive total system optimization including cost, plant reliability, importance of species to be screened, ecological impacts, demonstrated necessity for larval exclusion etc.; and tests should be standardized as much as possible in order to obtain comparable results at various sites. (LCL)

23410 **(DOE/EIA—0075(82/01)) Cost and quality of fuels for electric utility plants.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jan 1982. 69p. NTIS, PC A04/MF A01. Order Number DE83008070.

Portions are illegible in microfiche products.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility units in the 48 contiguous states and the District of Columbia. It is also intended to provide information in a concise format to satisfy the needs of a wide variety of audiences. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains monthly fuel cost, quality, and quantity data aggregated at the state and regional levels. 12-month tables are presented only at the regional level, with information at the plant level, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 mw or greater are covered. Data in the accompanying tables were compiled from monthly reports filed by electric utility companies.

23411 **(DOE/EIA—0075(82/04)) Cost and quality of fuels for electric utility plants.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Apr 1982. 68p. NTIS, PC A04/MF A01. Order Number DE83008016.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility units in the 48 contiguous states and the District of Columbia. It is also intended to provide information in a concise format to satisfy the needs of a wide variety of audiences. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains monthly fuel cost, quality, and quantity data aggregated at the state and regional levels. 12-month tables are presented only at the regional level, with information at the plant level, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 mw or greater are covered. Data in the accompanying tables were compiled from monthly reports filed by electric utility companies.

23412 **(DOE/EIA—0075(82/09)) Cost and quality of fuels for electric utility plants.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Sep 1982. 65p. NTIS, PC A04/MF A01. Order Number DE83007760.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility units in the 48 contiguous states and the District of Columbia. It is also intended to provide information in a concise format to satisfy the needs of a wide variety of audiences. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains monthly fuel cost, quality, and quantity data aggregated at the state and regional levels. 12-month tables are presented only at the regional level, with information at the plant level, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 mw or greater are covered. Data in the accompanying tables were compiled from monthly reports filed by electric utility companies.

23413 **(DOE/EIA—0075(82/10)) Cost and quality of fuels for electric utility plants.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Oct 1982. 64p. NTIS, PC A04/MF A01. Order Number DE83008823.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility generating units in the 48 contiguous states and the District of Columbia. It is also intended to provide information in a concise format to satisfy the needs of a wide variety of audiences. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains monthly fuel cost, quality, and quantity data aggregated at the state and regional levels. 12-month tables are presented only at the regional level, with information at the plant level, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 MW or greater are covered. Data in the accompanying tables were compiled from monthly reports filed by electric utility companies.

23414 **(DOE/EIA—0075(82/11)) Cost and quality of fuels for electric utility plants.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Nov 1982. 67p. NTIS, PC A04/MF A01. Order Number DE83009304.

Portions are illegible in microfiche products.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility generating units in the 48 contiguous states and the District of Columbia. It is also intended to provide information in a concise format to satisfy the needs of a wide variety of audiences. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains monthly fuel cost, quality, and quantity data aggregated at the state and regional levels. 12-month tables are presented only at the regional level, with information at the plant level, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 MW or greater are covered. Data in the accompanying tables were compiled from monthly reports filed by electric utility companies.

23415 **(DOE/NASA/10350—35) Critical Research and Advanced Technology (CRT) Support Project. Summary report.** Furman, E.R.; Anderson, D.N.; Hodge, P.E.; Lowell, C.E.; Nainiger, J.J.; Schultz, D.F. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Feb 1983. Contract AI01-77ET10350. 57p. (NASA-TM—83019). NTIS, PC A04/MF A01. Order Number DE83008176.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report summarizes the technical progress attained during 1977 to 1982 to provide a critical technology base for utility and industrial gas turbines by planning the use of coal-derived fuels. Development tasks were included in the following areas: (1) combustion - investigate the combustion of coal-derived fuels and methods to minimize the conversion of fuel-bound nitrogen to NO/sub x/; (2) materials - understand and minimize hot corrosion; (3) system studies - integrate and focus the technological efforts. A literature survey of coal-derived fuels was completed and a NO/sub x/ emissions model was developed. Flametube tests of a two-stage (rich-lean) combustor defined optimum equivalence ratios for minimizing NO/sub x/ emissions. Sector combustor tests demonstrated variable air contol to optimize equivalence ratios over a wide load range and demonstrated variable air control to optimize equivalence ratios over a wide load range and steam cooling of the primary zone liner. The catalytic combustion of coal-derived fuels was demonstrated. The combustion of coal-derived gases is very prom-

ising. A hot-corrosion life prediction model was formulated and verified with laboratory testing of doped fuels. Fuel additives to control sulfur corrosion were studied. The intermittent application of barium proved effective. Advanced thermal barrier coatings were developed and tested. Coating failutre modes were identified and new material formulations and fabrication parameters were specified. System studies in support of the thermal barrier coating development were accomplished.

23416 (EPRI-AP—2854) Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report. Canela, F.; Huang, J.; Ibe, A.P.; Padgett, S.C.; Rao, A.D.; Smelser, S.C. (Fluor Engineers, Inc., Irvine, CA (USA)). Feb 1983. 289p. NTIS, PC A13/MF A01. Order Number DE83901856.

Portions are illegible in microfiche products.

Fluor studied the feasibility of substituting fuel gas produced from coal for oil fuel at a modern oil-fired boiler plant and of repowering the same boiler plant using fuel gas from coal as the combustion turbine fuel as well as boiler fuel in some cases. Several cases were investigated, including cases with the fuel gas plant connected to the boiler plant with a 50-mile gas delivery pipeline. The Texaco, Inc., coal gasifier was used for the fuel gas production. This gasifier is still under development, and the study results are highly dependent on development of the gasifier to the commercial configuration and cost used in the study. It appears that some savings might be universally available since fuel price differentials of the magnitudes tabulated can be expected in most areas of the United States. When a boiler plant is repowered, a considerable additional quantity of electricity can be produced at relatively low cost through the conversion of the boiler plant to a more efficient combined-cycle type of operation. If the boiler plant is repowered with fuel gas, plant capacity can be increased by up to 73%, and levelized cost of total electricity can be reduced by up to 7.2 mills per kWh (1980 $) below the cost when gas is simply substituted for oil. The boiler plant could be replaced with a new conventional coal-fired plant of the same capacity or a new conventional coal-fired plant of the same capacity as a repowered boiler plant could be installed. In either case, no clear advantage was found with respect to either new capital requirements or cost of electricity if a gas-from-coal system were to be employed. However, a fuel gas system does present an opportunity to reduce capital requirements considerably because fuel gas could be purchased over-the-fence from a second party. Capital requirements for fuel gas substitution would amount to only about $5/kW.

23417 (EPRI-AP—2871-CCM) Gas-Turbine Evaluation (GATE) Computer Program: thermodynamic cycles, methods, and sample cases. Final report. (Waters (Mark) and Associates, Inc., Sunnyvale, CA (USA)). Feb 1983. 115p. NTIS, PC A06/MF A01. Order Number DE83901852.

A computer program to compute detailed power plant performance using the results of advanced turbine research has been developed by this project for EPRI. This program is named Gas Turbine Evaluation (GATE). This report contains the initial documentation of the program and discusses different power-plant cycle options, the engineering approach and methods used, and sample cases to demonstrate applications. The analysis primarily involves the thermodynamics and gas dynamics of air-vapor-fuel mixtures, with a heavy emphasis on the details of the flow in each stage of the turbine, including accurate calculation of cooling-air requirements and stage efficiencies. A later report will contain a description of the additions and upgrades to the program that are planned in the project extension.

23418 (EPRI-AP—2883) Ceramic-heat-exchanger technology. Final report. Ward, M.E.; Kubasco, A.J. (Solar Turbines, Inc., San Diego, CA (USA)). Mar 1983. 103p. NTIS, PC A06/MF A01. Order Number DE83901832.

Portions are illegible in microfiche products.

Technology for pressurized, high-temperature, ceramic-tube heat exchangers is being established by environmental, design, and fabrication studies. The design study included the finite-element stress analysis of the ceramic components contained in the DOE Ceramic Heat Exchanger Test Module. This test module contains twenty-eight, 4.56-m(15 ft)-long ceramic tubes with a 11.43-cm(4.5 in.)-dia ceramic header. It has been operated successfully for 125 h up to firing temperatures of 1700°K (2600°F) and outlet air temperatures of 1533°K (2300°F) at 689.4 kPa (100 psia). This unit was then fired with a pulverized-coal burner under EPRI sponsorship for 25 h.

23419 (EPRI-EA—2880-Vol.1) Analysis of power-plant-construction lead times. Volume 1. Analysis and results. Bauman, D.S.; Morris, P.A.; Rice, T.R. (Applied Decision Analysis, Inc., Menlo Park, CA (USA)). Feb 1983. 97p. NTIS, PC A05/MF A01. Order Number DE83901833.

Portions are illegible in microfiche products.

Long and increasingly uncertain leadtimes have created serious problems for utilities by raising capital costs and making planning for future load growth difficult. Today the combination of large capital expenditures over a long period and high interest rates causes time-dependent charges to make up a substantial portion of total capital costs. This study was a two-year research project to develop information about construction leadtimes, the underlying causes of long leadtimes and schedule delays, and potential alternatives for controlling delays and reducing leadtimes. This study focuses on leadtimes and costs that are time-related (escalation and interest during construction). Its objective is to provide improved methods for estimating leadtimes and, to the extent feasible, identify specific ways for controlling construction delays and reducing leadtimes. The study utilized both quantitative and qualitative methods to isolate causal factors and to understand how power-plant-construction leadtimes have changed and what the underlying forces driving these changes have been. The results indicate that while fossil plant construction leadtimes have remained stable, and while the leadtimes for recent nuclear plants will likely be lower than their immediate predecessors, if new nuclear capacity is ordered during the 1980's, leadtimes will continue to grow unless these orders are accompanied by a significant change in the regulatory process.

23420 (EPRI-NP—2751) Fire tests in ventilated rooms: detection of cable-tray and exposure fires. Newman, J.S. (Factory Mutual Research Corp., Norwood, MA (USA)). Feb 1983. 91p. NTIS, PC A05/MF A01. Order Number DE83901860.

The purpose of this work was to assess the response of typical commercial smoke detectors (ionization and photoelectric types) to fires in ventilated rooms representative of utility environments. Detector response has been evaluated for a number of combustibles including both flaming and nonflaming cables and exposure fires. Detector response relationships are developed as a function of the following parameters: (1) the smoke transit time; (2) a detection time factor; (3) a detector sensitivity factor; (4) a ventilation factor; and (5) the nondimensional detector spacing. In addition, an example of smoke detector spacing requirements is given based upon the results of cable tray fire tests in a ventilated environment.

23421 (ERATL—83-10) Electric Power Plant International. Escombe, F.M.; Rawnsley, A. (ERA Technology Ltd., Leatherhead (UK)). Jan 1981. 500p. (ERA—80-142). NTIS, PC $85.00.

The report provides technical and commercial guidance on power plants, an analysis of power systems worldwide, information on equipment suppliers and on organizations providing consultancy, construction and other services. The following chapters are included: generating plant; prime movers; generators; inverter systems and associated products and services.

23422 (IBRD-WP—091) Investment analysis in electricity supply. Staff working paper. Anderson, D. (International Bank for Reconstruction and Development, Washington, DC (USA)). Nov 1970. 97p. NTIS, PC A05/MF A01.

This study reviews, develops, and tests quantitative methods of appraising investments in electricity supply. Typical decision variables considered are: choice of fossil, nuclear, or single- or multi-purpose hydroplant; location of plant; directions of electrical energy transport; timing of investments; replacement; and, in all cases, the optimum mode of system operation.

23423 (Juel-Spez—70(Vol.1)) Energy technology data handbook. Vol. 1. Manthey, C. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Programmgruppe Systemforschung und Technologische Entwicklung). Jan 1980. 416p. NTIS (US Sales Only), PC A18/MF A01. Order Number DE83750375.

Portions are illegible in microfiche products.

Volume I of the report includes information about a selection of energy conversion technologies like fossil, nuclear and renewable power and heating plants, coal gasification, liquefaction and hydrogen production. The technologies are characterized in a standard format following common ground rules and basic assumptions. A technology characterization includes technical, economic and some environmental parameters as well as a short system description.

23424 (PB—83-149781) Fluidized bed retrofit study of CE-VUX type boiler at the Jamestown Board of Public Utilities, Carlson Station, Jamestown, New York. (Combustion Engineering, Inc., Windsor, CT (USA)). Jan 1981. 163p. NTIS, PC A08/MF A01.

This report describes the design and economic analysis for retrofitting a boiler at the Jamestown Municipal Utility to an atmospheric fluidized bed combustor capable of burning high sulfur coal and industrial waste in an environmentally acceptable manner. Schedules and a cost breakdown were developed for the atmospheric fluidized bed retrofit, with various industrial wastes evaluated as boiler fuels and conclusions drawn as to the overall economic feasibility of boiler conversions involving occasional combustion of industrial waste.

23425 Low chemical concentrating steam generating cycle. Mangus, J.D. (to Dept. of Energy). US Patent 4,367,628. 11 Jan 1983. Filed date 27 Feb 1981. vp.

PAT-APPL-238774.

A steam cycle for a nuclear power plant having two optional modes of operation. A once-through mode of operation uses direct feed of coolant water to an evaporator avoiding excessive chemical concentration buildup. A recirculation mode of operation uses a recirculation loop to direct a portion of flow from the evaporator back through the evaporator to effectively increase evaporator flow.

23426 Economics of cool storage for electric load leveling. Asbury, J.G. (Argonne National Lab., IL); Dougherty, D. *Proceedings of the American Power Conference;* 43: 676-682(1981).

Equipment and methods for cold storage in commercial buildings to effect reduced summer peak load demands for electric utilities are described and the economics of this load leveling means is examined using the Potomac Electric Power Co. (PEPCO) studies and data. This examination reveals that investments in this technology can offer attractive paybacks (3 to 5 y) in new building applications. Partial storage, because of chiller-capacity savings, offers faster payback than full-storage systems. Estimates of its market potential indicate that cool storage will play an important role in PEPCO's Energy Use Management Plan. (LCL)

2002 Environmental Aspects

REFER ALSO TO CITATION(S) 22945, 22947, 22948, 22952, 22953, 22954, 22955, 22958, 23767, 24401

23427 (ANL/EES-TM—210) Review of the effects of the Clean Water Act on cooling-system selection by the steam-electric industry. Paddock, R.A.; McCown, D.L. (Argonne National Lab., IL (USA)). Jun 1982. Contract W-31-109-ENG-38. 75p. NTIS, PC A04/MF A01. Order Number DE83008641.

A review of surveys of the steam-electric industry in general and the nuclear industry in particular has shown a significant trend away from open-cycle cooling and toward closed-cycle cooling that is at least in part a consequence of the Clean Water Act and subsequent EPA guidelines and standards. Among older plants, which are not significantly affected by the Clean Water Act, nearly 85% use some form of open-cycle cooling. However, among plants that are under construction or planned, only 10 to 15% plan to use open-cycle cooling. Most of this trend is apparently due to anticipation of restrictions on open-cycle cooling rather than to direct action by the EPA prohibiting open-cycle cooling at specific sites, because requests for permission to operate open-cycle cooling systems have been denied for less than 1% of all existing and new capacity. A review was made of the potential environmental effects, water consumption rates, capital and generating costs, and energy usage associated with open-cycle and closed-cycle cooling systems. No evidence was found that clearly supports a general preference for any type of cooling system over another. However, on a case-by-cae basis, site-specific conditions may indicate a preferred cooling technology. It is concluded that the opportunity for the use of all available cooling options should be retained and that an effort should be made to assure the steam-electric industry that the options are indeed available.

23428 (CONF-820551—2) Experimental evaluation of spray-dryer flue-gas desulfurization for use with Eastern US coals. Yeh, J.T.; Demski, R.J.; Gyorke, D.F.; Joubert, J.I. (USDOE Pittsburgh Energy Technology Center, PA). 1982. 21p. NTIS, PC A02/MF A01. Order Number DE83008420.

From EPA/EPRI symposium on flue gas desulfurization; Hollywood, FL, USA (17 May 1982).

An experimental study of spray dryer flue gas desulfurization has been carried out with the objective of evaluating this technology for potential use in facilities burning Eastern US coals. The investigation was conducted using a 500 lb/hr pulverized-coal-fired furnace equipped with a spray dryer and baghouse. Parameters studied included sorbent type, sorbent/sulfur ratio, approach to adiabatic saturation temperature at the spray dryer outlet, and atomizer rotation speed. The bulk of the testing was carried out with lime slurries, but some tests were also conducted with slurries of limestone, magnesium oxide, and lignite fly ash. With lime slurries, SO_2 removal efficiencies in excess of 90 percent were achieved at relatively low sorbent/sulfur ratios. Spray dryer FGD systems offer several advantages over conventional wet scrubbing systems: there is no need for sludge handling equipment; scaling and plugging problems often occurring in wet scrubbers are avoided; lower quality steel can be used for construction of vessels; energy and water consumption is significantly less; and finally, recent studies (1, 2, 3) indicate potential economic advantages of dry FGD systems over conventional lime - or limestone-based, wet scrubbing systems.

23429 (UCRL—88867) Effects of copper speciation on aquatic ecosystems. Harrison, F.L. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 36p. (CONF-8203123—1). NTIS, PC A03/MF A01. Order Number DE83009241.

From Workshop on effects of trace elements on aquatic ecosystems; Raleigh, NC, USA (23 Mar 1982).

The kinds and quantities of copper species present in influent and effluent waters were determined in samples collected from power stations located adjacent to marine, estuarine, and freshwater ecosystems. Copper concentration and speciation differed with the site, season, and mode of operation of the station. Under normal operating conditions, the differences between influent and effluent waters were generally small and, at those sites where measurements of chemical form were taken, most of the copper was in bound (complexed) species. During startup of water circulation through cooling systems and during changeover from an open- to a closed-cycle operation, however, copper was high in concentration. The size, chemical form, and duration of the copper pulse released during startup and changeover differed with factors such as the interval between shutdown and startup, preconditioning of the condenser tubing, and hydrodynamic conditions. The effect of copper speciation on copper toxicity was evaluated. The responses to different chemical forms of copper differed with species and life stage. Some primary producers and early life stages of higher trophic organisms are sensitive to low levels of labile copper. Sublethal effects of copper on bluegills were assessed in populations living in the intake and discharge zones of a station adjacent to a fresh-water impoundment. These populations showed structural abnormalities

and reduced reproductive capacity. Tissue analyses showed elevated copper concentrations in the livers. Liver metalloproteins were separated and quantified. The results indicated that metal detoxification systems in the bluegills were saturated and copper was present in some metalloprotein pools in levels that may result in impairment of metabolic functions.

2003 Power Transmission And Distribution

REFER ALSO TO CITATION(S) 24109

23430 (BMFT-FB-DV—80-007) Use of computers for the documentation of supply lines. Leibbrand, W.; Koehler, T.; Heidinger, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 424p. (In German). NTIS (US Sales Only), PC A18/MF A01. Order Number DE83750366.

Portions are illegible in microfiche products.

The use of computer systems for the documentation of gas, water, and electricity lines will gain strong importance in the years to come. In the Federal Republic of Germany, some major supply companies have turned to record their utility maps using interactive graphical systems and to establish data bases for the administration of network data. By means of a study, qualified statements are given in regard of the criteria to be taken into account by a utility company with the introduction of computers in this sector. This information refers to hardware and software problems as well as to organizational aspects.

23431 (BMFT-FB-T—79-115) Investigation of the interaction between the power electronic circuit and power supply systems. Beck, H.P.; Hermann, R.; Knuth, D.; Schwarzenau, R. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1977. 336p. (In German). NTIS (US Sales Only), PC A16/MF A01. Order Number DE83750339.

Portions are illegible in microfiche products.

Sources and consequences of the interaction between power electronics, power supply systems and telecommunications equipment were examined with the aid of measuring procedures and are presented here, using selected examples from traction and industrial drive technology. Apart from this the most important variables necessary to assess the power-line load, such as power factor, relative harmonic content and noise current, were calculated for conventional and low feedback effects converters taking various influencing factors into consideration. Another point of main emphasis in this research work is the analysis of the energy conditions prevailing in static converters for single-phase and three-phase supplies in particular in the case of pulsing methods for power control free of feedback effects. The methods and circuits for compensation and balancing of surge loads are described in detail in accordance with their technological significance. In the field of static high speed reactive power compensation with thyristor-controlled power capacitors new circuits and control techniques were developed. Work in the field of filter circuits reveals new application possibilities in power supply-systems with a high load of harmonic currents. Innovated noise current-reducing converter-wiring and controlled tuned capacitor banks can contribute to the prevention of mains resonance and other interferring factors influencing the performance of telecommunications equipment.

23432 (BNL—32503) Development of a fully synthetic tape insulation for lapped power cables. Forsyth, E.B.; Muller, A.C. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 6p. (CONF-830705—1). NTIS, PC A02/MF A01. Order Number DE83007387.

From IEEE Power Engineering Society summer meeting; Los Angeles, CA, USA (17 Jul 1983).

Portions are illegible in microfiche products.

The characteristics of the traditional kraft paper/oil insulation of power transmission cables are the limiting factors of cable performance in some applications. An insulating tape of an oriented polyolefin has been developed to overcome these limitations by improving the operating stress, heat transfer, charging current and SIC of a cable. Results are presented of tests on new materials and small cable samples. The test data are extrapolated to cable designs for 345 and 550 kV.

23433 (DOE/ET/29071—T4) Compact gas-insulated transformer. Thirteenth quarterly report. (General Electric Co., Pittsfield, MA (USA). Power Transformer Dept.). Mar 1983. Contract AC02-79ET29071. 132p. NTIS, PC A07/MF A01. Order Number DE83009379.

Portions are illegible in microfiche products.

Progress is reported in a program whose overall objective is to develop new technologies for application in a radically new power transformer design. The specific objective lies in designing a transformer whichis more efficient, more compact, lower in weight and audible sound, nonflammable, which does not rely upon mineral oil insulation, and which is compatible with the gas insulated electrical system of the future. This program, which will last over three years, has as its goal the development of design and manufacturing technology. Design prototypes in the 50 MVA-345 kV range will be tested. In addition to the development of technologies, the program provides for economic, environmental, and systems application assessments of the emergent technologies.

23434 (EPRI-EL—2348-Vol.1) Phase II: frequency domain analysis of low-frequency oscillations in large electric power systems. Volume 1. Basic concepts, mathematical models, and computing methods. Final report. Byerly, R.T.; Sherman, D.E.; Bennon, R.J. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Advanced Systems Technology Div.). Apr 1982. 284p. NTIS MF A01. Order Number DE82903570.

Microfiche only, copy does not permit paper copy reproduction.

When major electric power systems are interconnected through ties of relatively small capacity, low-frequency intersystem oscillations are likely to be troublesome for some operating conditions. Spontaneous intersystem oscillations which have occurred in the western and north central states attest to this aspect of system behavior. The long distances which separate concentrations of generating capacity in those systems also separate many individual generating plants from other machines; so that localized, poorly damped, higher frequency modes of oscillation also exist. The potential for unstable oscillations must be considered in planning the bulk generation and transmission system, in designing control systems for turbine-generators and dc line terminals, and in system operations. Present practice depends almost entirely on time-domain simulation for large system analysis, with computing costs that are relatively high and information in a form which is often not well suited to study purposes. The objective of this research is to develop an alternative to time-domain simulation for damping studies. This alternative involves the use of a linearized system model for calculating the natural frequencies and damping factors of oscillations between generator rotors.

23435 (EPRI-EL—2834) Electrohydrodynamic pumping in cable pipes. Final report. Crowley, J.M.; Chato, J.C. (Illinois Univ., Urbana (USA)). Feb 1983. 432p. NTIS, PC A19/MF A01. Order Number DE83901838.

Portions are illegible in microfiche products.

Many oil-insulated electric power cables are limited by heat buildup caused in part by the low thermal conductivity of the oil. Circulation of the oil is known to reduce the cable temperature, but can lead to excessive pressure buildup on long cables when using conventional pumping methods. An alternate pumping method using distributed electric fields to avoid this pressure buildup is described. Electrohydrodynamic (EHD) pumping was studied both theoretically and experimentally for possible application in underground cable cooling. Theoretical studies included both analytical and finite-element analysis of the flow patterns driven by travelling electric fields. Experimentally, flow rates in a cable-pipe model were measured under a wide variety of operating conditions. Theory and experiment are in agreement for velocities below 10 cm/s, but higher velocities could not be reached in the experiment, due to increased electroconvection and, possibly, turbulence.

23436 (EPRI-EL—2847) Increasing pipe-cable section lengths. Final report. Moran, J.A. Jr. (Power Technologies, Inc., Schenectady, NY (USA)). Mar 1983. 120p. NTIS, PC A06/MF A01. Order Number DE83901873.

Portions are illegible in microfiche products.

This report summarizes the results of an experimental program which developed a needed reliable data base on modern pipe-type cable construction from which designers can knowledgeably consider maximizing cable pulling lengths with resulting cost savings. The program comprised evaluations of available commercial constructions over the range of conductor sizes (both copper and aluminum) and insulation thicknesses in general utilization. The work focussed on determining the cable's performance under the three mechanical stress modes to which the cable is subjected during installation; (a) tension and elongation, (b) torsion and (c) sidewall (bearing) pressure in bends. Additionally, the program included experimentation to determine the effective coefficient of friction of the various combinations of modern skid wire materials and pipe filling oils used as lubricants with the cable in both triangular and cradled configuration. The cables tested were equipped with pulling bolts of various commercial and experimental designs permitting evaluation of their suitability for severe pulls.

23437 (EPRI-EL—2870) Transmission-line structure foundations for uplift-compression loading. Final report. Trautmann, C.H.; Beech, J.F.; O'Rourke, T.D.; McGuire, W.; Wood, W.A.; Capano, C. (Cornell Univ., Ithaca, NY (USA); GAI Consultants, Inc., Monroeville, PA (USA)). Feb 1983. 396p. NTIS, PC A17/MF A01. Order Number DE83901858.

Portions are illegible in microfiche products.

This report is a state-of-the-art assessment of foundation engineering for transmission line structures, with particular emphasis on uplift/compression foundation design loads. The scope of this report is broad and includes many aspects of geotechnical, foundation and structural engineering. After presenting the basic analysis/design philosophy, strategies for site characterization are described. Procedures for site reconnaissance, field exploration and laboratory testing follow. Detailed methodologies are given to evaluate the compression and uplift capacities of foundations in soil, including procedures to predict foundation movements. Evaluation of foundations in rock and anchors follows. Load test procedures and methods to evaluate load test results are described, with illustrations that confirm the design methodologies. The response of transmission line structure to differential foundation movements is presented with examples, and an illustration is given of total structure response to foundation movements. A summary section is given to provide an overview of the foundation analysis/design methodology, and the report is concluded with detailed research recommendations. Appendices provide further information on several of the topics. A supplemental volume has also been prepared which includes data on 804 foundation load tests.

23438 (EPRI-EL—2876) Metal-oxide surge arresters for gas-insulated systems, Phases I and II. Final report. Miller, D.B.; Potter, M.E. (Brown Boveri Electric, Inc., Chalfont, PA (USA)). Feb 1983. 365p. NTIS, PC A16/MF A01. Order Number DE83901849.

Portions are illegible in microfiche products.

The development of metal-oxide surge arresters for gas-insulated systems is described. The arrester is contained in SF_6 gas in an aluminum enclosure which is designed to connect directly to a port in a gas-insulated substation. Special MOV blocks were produced for operation in SF_6. A technique was developed for soldering these blocks together for strength and simplicity in assembly. Special care is taken so that the soldered blocks are not affected by high-energy discharges. Three, 362kV prototype arresters were assembled, each using three parallel columns of these soldered 50-mm blocks. The electrical length of each column is 2330 mm. This MOV assembly is centered within a 660 mm (26") diameter by 3451 mm long aluminum tank. Uniform grading along the MOV column is achieved by a series of ceramic capacitors which are connected along the column. This prototype was designed on the basis of results from three types of analytical studies. First, a heat-transfer model was developed to predict the temperature of the MOV blocks for various operating voltages, currents, and ambient temperatures. A thermal mock-up was assembled to verify this heat-transfer model and provide empirical coefficients. Second, electric-field derivations were carried out to ensure that electric stresses would be kept below 4kV (rms)/mm. Finally, an electric-circuit-equivalent model was prepared to derive the values for the grading capacitors. Continuous testing for 72 h at a-c voltage in the range of 209 to 285kV confirmed the predicted operation and thermal stability of this prototype design. The behavior of this arrester in typical power-systems applications are shown by computer calculations for lightning surges and switching operations. The expected effects of seismic activity and internal fault arcs are also derived. Basic characteristics of gas-insulated metal-oxide arresters for 69, 138, 230 and 500kV were also derived.

23439 (NP—3770035) Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage. Brockmann, R. (Hannover Univ. (Germany, F.R.). Fakultaet fuer Maschinenwesen). 18 Jun 1981. 152p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83770035.

Portions are illegible in microfiche products; Thesis.

A report is given on alternating voltage tests on defined impure epoxide resin insulators in SF_6 atmosphere. The electric stability of a barrier longer arrangement was seen to be reduced by deposited impurities. This is valid for the thinnest, conducting layers as well as for dielectrica or metal particles of larger dimensions. The experimental results are explained based on disruptive mechanisms in gaseous SF_6 by excess field strength at the barrier layer depending on the various impurity parameters.

23440 (TVA/OP/OPS—83/1) Use of oscillograph records for analyzing system performance. Boyle, J.R. (Tennessee Valley Authority, Chattanooga (USA). Power System Operations). 1983. 28p. NTIS, PC A03/MF A01. Order Number DE83901682.

Portions are illegible in microfiche products.

Protection of present-day power systems is accomplished by a complex system of extremely sensitive relays that function only during a fault. Because relays are extremely fast, automatic oscillographs installed at convenient locations can be used successfully to determine the performance of protective equipment during abnormal conditions. The purpose of this apper is to provide an insight into the importance of automatic oscillographs and how they can be used to analyze system performance.

23441 Hierarchical stability and alert state steering control of interconnected power systems. Sastry, S.; Varaiya, P. (Univ. of California, Berkeley). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Circuits and Systems;* **CAS-27**: No. 11, 1102-1112(Nov 1980). Contract AS01-78ET29135.

A state-space model of an interconnected power system having both generator and load nodes is proposed. The resulting system of equations is interpreted as the degenerate limit of a singularly perturbed system. The model is used to derive a condition for the (local) asymptotic stability of an equilibrium. This condition decomposes in an intuitive way for subsystems interconnected via a backbone network. The model is used to formulate the problem of steering the power system from a postdisturbance alert state to a secure state, and a solution to the steering problem is also proposed.

21 NUCLEAR POWER PLANTS

REFER ALSO TO CITATION(S) 23731, 23732, 23733, 23734, 23735, 23736, 23737, 23738, 23739

23442 (DOE/NBM—3008716) Nuclear power industry, 1981. (Argonne National Lab., IL (USA)). Dec 1981. Contract W-31-109-ENG-38. 432p. NTIS, PC A19/MF A01. Order Number DE83008716.

Portions are illegible in microfiche products.

The intent of this publication is to provide a single volume of resource material that offers a timely, comprehensive view of the nuclear option. Chapter 1 discusses the development of commercial nuclear power from a historical perspective, reviewing the factors and events that have and will influence its progress. Chapters 2

through 5 discuss in detail the nuclear powerplant and its supporting fuel cycle, including various aspects of each element from fuel supply to waste management. Additional dimension is brought to the discussion by Chapters 6 and 7, which cover the Federal regulation of nuclear power and the nuclear export industry. This vast body of thoroughly documented information offers the reader a useful tool in evaluating the record and potential of nuclear energy in the United States.

23443 **(DOE/TIC—8200-R44) Nuclear reactors built, being built, or planned in the Unites States as of June 30, 1981.** Goulden, A.M. (ed.). (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). Jan 1983. 48p. NTIS, PC A03/MF A01. Order Number DE81023785.

Nuclear Reactors Built, Being Built, or Planned contains unclassified information about facilities built, being built, or planned in the United States for domestic use or export as of June 30, 1981, which are capable of sustaining a nuclear chain reaction. Information is presented in five parts, each of which is categorized by primary function or pupose: civilian, military, production, export, and critical assembly facilities.

23444 **(DOE-tr—109) Operatirg experiences with nuclear power plants in the Federal Republic of Germany.** Translated from *Atom + Strom ;* **21**: No. 5-6, 33-58(1975). 57p. NTIS, PC A04/MF A01. Order Number DE83009131.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Operating statistics for the year 1974 are presented. (HDR)

2101 Power Reactors, Non-breeding, Light-water Moderated, Boiling Water Cooled

REFER ALSO TO CITATION(S) 23116, 23506, 23522, 23523, 23526, 23527, 23532, 23533, 23534, 23535, 23571, 23609, 23612, 23613, 23614, 23635, 23636, 23653, 23654, 23920

23445 **(ANL/NESC—763) REFLUX; LWR reflood heat transfer prediction.** Kirchner, W.L. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048763.

REFLUX is expected to provide reasonable results for flooding rates of 0.4 to 10 in/sec, pressures of 15 to 60 psia, peak powers of 0.5 to 1.5 kw/ft, inlet coolant temperatures of 50 degrees F to saturation, and initial temperatures of 250 to 2000 degrees F. Flow reversals cannot be analyzed with the present version.

REFLUX calculates the temperature-time history of a representative fuel rod during the reflood stage of a hypothetical loss-of-coolant accident (LOCA). The logic used for selection of the appropriate flow regime for analysis of the cladding temperature transient is based on the axial position with regard to the continuous liquid level (based on a mass balance), a liquid carry-over criterion (derived from a force balance on a drop suspended in a vapor stream), and the local cladding surface temperature. A generalized boiling curve is constructed, and the local flow and clad conditions determine the applicable heat transfer coefficient.IBM360; FORTRAN IV; OS/360; Tape unit, line printer, and 100K bytes of memory.

23446 **(ANL/NESC—844) FUELS DATA; model verification fuel rod data.** Laats, E.T.; Hampton, N.L. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048844.

Maxima of 70 operating steps, 5 axial power distribution profiles, 3 measurement locations. Reference reports, EGG-CAAP-5114 and EGG-CAAD-5486.

FUELS DATA is a collection of machine-readable fuel behavior data from domestic and foreign water reactor test facilities developed for use in model verification of the Nuclear Regulatory Commission FRAP codes.CDC CYBER176,175;CDC7600; FORTRAN IV for the auxiliary edit program, data are recorded as EBCDIC characters.; NOS/BE 1.4 (CDC CYBER176), NOS 1.3 (CDC CYBER175), SCOPE 2.1 (CDC7600); 36,000 (octal) words of memory are used by the auxiliary editing program.

23447 **(DOE/ET/34203—47) Oxygen suppression in boiling-water reactors: Phase 2. Final report.** Burley, E.L. (comp.). (General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.). Oct 1982. Contract AC02-76ET34203. 101p. (NEDC—23856-7). NTIS, PC A06/MF A01. Order Number DE83009392.

An oxygen suppression demonstration was completed at the Dresden-2 plant of Commonwealth Edison Co. (CECo) during May and June 1982. The suppressing chemical additive was hydrogen gas dissolved in the reactor feedwater at concentrations from 0 to 1.8 parts per million (ppM). At full power oxygen in the primary coolant in the recirculation system was reduced to 15 parts per billion (ppB); oxygen in the steam was reduced to 3 ppM. Power level did not influence the effectiveness of oxygen suppression in the core exit water (steam), but had a profound effect on the oxygen concentration of the water entering the recirculation piping. Hydrogen addition caused slight, but real and repeatable increases in primary coolant conductivity and pH. Corrosion product concentrations in the feedwater decreased during the test.

23448 **(DOE/NE/34087—T1-Vol.1) LWR extended burnup: fuel performance and utilization.** (American Nuclear Society, Lynchburg, VA. Virginia Section). 1982. Contract AC02-81NE34087. 357p. (CONF-820472—Vol.1). NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Separate abstracts are included for eash of the papers presented concerning extended burnup fuel performance; fission product behavior in extended burnup fuel rods; and phenomena associated with extended burnup.

23449 (DOE/NE/34087—T1-Vol.1, pp 1.71-1.82) **Extended burnup fuel investigations in commercial reactors.** Baumgartner, J.A.; Baily, W.E.; Proebstle, R.A.; Schardt, J.F. (General Electric Co., San Jose, CA). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Fuel surveillance and lead test assembly programs in commercial reactors have been extended in time of exposure and in burnup as an important means of investigating extended burnup fuel performance in Boiling Water Reactor systems. The high burnup areas of interest include irradiation growth, corrosion of the cladding, spacer spring relaxation, and fission gas release. Information from these investigations is being used to assess the performance of the current fuel design operating to higher burnup and assess the need for fuel bundle modifications for an extended burnup fuel design. Information has been obtained from reactor site measurements of fuel bundles and individual rods during refueling outages. Comparisons are made to preirradiation measurements to assess the fuel bundle performance. Results have been obtained from three commercial reactor sources at bundle average burnups to approximately 40 GWd/mtU. The results show good agreement from the different sources, and the predictable trends indicate that the target burnups for the surveillance bundles are achievable.

23450 (DOE/NE/34087—T1-Vol.1, pp 1.83-1.100) **KWU experience and analysis of LWR fuel with respect to high burnup.** Stehle, H.; Fuchs, H.P.; Knaab, H.; Manzel, R. (Kraftwerk Union AG, Erlangen, Germany). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Over the past decade, KWU has carried out a number of post-irradiation examination programs on fuel assemblies of extended burnup. The data derived cover a wide range of linear heat

generation rates and peak pellet burnups up to 52 GWd/t(U) for PWRs and 45 GWd/t(U) for BWRs. It is concluded that at the present discharge burnup LWR fuel is still far from the systematic wear-out life phase. There is a good chance to increase the target burnup by only minor design adaptations with negative consequences for reliability or safety considerations. From the design point of view waterside cladding corrosion, fission gas release, and fuel rod growth are the most important topics to be considered. Experiments and model predictions show the influence of the power history and partly of the plant thermohydraulic parameters.

23451 (DOE/NE/34087—T1-Vol.1, pp 2.21-2.29) **DOE/GE/NSP extended burnup program.** Nevinski, D.E. (Northern States Power Co., Minneapolis, MN). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

A program to study the effects of extending peak pellet exposures above 50,000 MWD/MT in an operating boiling water reactor was begun in 1979. The intent of the program was to prove that fuel bundle integrity could be maintained while safely operating the fuel beyond its original design exposure. The bases for the utility's decision to proceed with the program are explained, along with the details of program implementation at the plant site. Bundle visual and metallurgical analyses have confirmed acceptable mechanical performance up to 43,000 MWD/MT to date. Also, the impact on the utility involved has been acceptably low in terms of personnel involvement and actual manhours required to support the program.

23452 (DOE/NE/34087—T1-Vol.1, pp 2.49-2.64) **ASEA-ATOM BWR fuel rod experience at high burnup.** Junkrans, S.; Vaernild, O.; Vesterlund, G. (AB ASEA-ATOM, Vaesteras, Sweden). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The first core of ASEA-ATOM 8 x 8 BWR fuel went into commercial operation more than 10 years ago. The design changes introduced later have been relatively few and the total experience is therefore relevant to the current fuel. The total experience comprises 7000 irradiated assemblies. Peak assembly burnup is 35 MWd/kg U and maximum residence time is 45,000 EFPH. The fuel rod failure rate has been very low including batches up to 28 MWd/kg U. The leaking rods detected have not been associated with high burnup. The PCI operating recommendations have been in use since 1976 and have been successful. The associated loss in capacity factor is 0.4%. Zircaloy corrosion is considered a major concern for extended burnup of LWR fuel. The general corrosion rate for standard BWR cladding has been found to be quite acceptable but variations occur with variations in coolant chemistry and Zircaloy micro-structure. Improved cladding material has been introduced and irradiation tested. A large hot-cell examination program comprising 50 full size rods at medium and high burnup is reported and discussed.

23453 (DOE/NE/34087—T1-Vol.1, pp 2.65-2.75) **High burnup performance of BN fuels in LWR's.** Bairiot, H.; Haas, D.; Lippens, M. (Belgonucleaire, Brussels, Belgium). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Based on the results obtained on high burnup uranium and plutonium enriched rods from BR 3 and DODEWAARD, it is shown that pellet-cladding mechanical interaction is lower in the mechanically blended mixed oxide, whereas fission gas release is larger. Failures have been observed in austenitic stainless steel cladding (PCI failures) and in Zircaloy cladding: oxidation after crud deposit in BR 3, stress corrosion cracking and hydriding in DODEWAARD.

23454 (DOE/NE/34087—T1-Vol.1, pp 2.77-2.85) **Study of LWR fuel behavior by well characterized tests. Part I. Inpile measurement of cladding diametral deformation with burnup.** Ichikawa, M.; Yanagisawa, K.; Fujita, M. (Japan Atomic Energy Research Inst., Ibaraki). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The influence of irradiation up to 25,000 MWd/tU on cladding diametral and axial deformation during power increase is studied. The major findings of this work are related to the differences in behavior of fuel at low and high burnup. Particular emphasis is placed on the fact that only elastic strains are measured on power at high burnup; thus, it should be noted that post-irradiation examination cannot reveal information on the stress level inpile. It is also found that midpellet deformation indicates a decrease at low burnup and an increase at high burnup.

23455 (DOE/NE/34087—T1-Vol.1, pp 2.87-2.95) **Study of LWR fuel behavior by well characterized tests. Part II. Post-irradiation examination and its related analysis of TSURUGA fuel.** Tsuchie, Y. (Japan Atomic Power Co., Tokyo); Iwamoto, K. 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Aiming at (a) understanding on in-reactor behavior and demonstration on integrity of LWR fuel, (b) demonstration of domestic (Japanese) nuclear fuel fabrication technology, and (c) collection of reference data of high quality, which can be extrapolated to extended burnup, post-irradiation examination of two fuel bundles (well-characterized during fabrication, type: 7 x 7, bundle average burnup: 22,000 MWd/tU, reactor: JAPC Tsuruga, BWR 357 MWe) is being executed at JAERI, Tokai. Based on detailed results of this post-irradiation examination and its related analysis, expected fuel performances in case of burnup extension are discussed.

23456 (DOE/NE/34087—T1-Vol.1, pp 3.3-3.21) **Evaluation of published high burnup fission gas release data.** Beyer, C.E. (Battelle Pacific Northwest Labs., Richland, WA). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Fission gas release is known to be sensitive to the operating temperature of the fuel; however, recent evidence has indicated that burnup (particularly above 30 MWd/kgM) may have an influence on gas release. Fission gas release data from five open literature data sources were examined to evaluate the possible effect of burnup on gas release. Operating fuel temperatures were evaluated and fission gas release data were compared against four gas release model predictions with varying degrees of burnup enhancement. From these comparisons, at least a moderate burnup enhancement was indicated for UO_2 fuels operating at high temperatures and burnups of 45 MWd/kgM. No or a weak burnup enhancement was indicated for fuels at high temperatures below 30 MWd/kgM burnup. Also, no burnup enhancement was indicated for fuel that operates at low temperatures and burnups up to 37 MWd/kgM.

23457 (DOE/NE/34087—T1-Vol.1, pp 3.59-3.75) **Fission gas release from fuel rods irradiated in US commercial light water reactors.** Ocken, H. (Electric Power Research Inst., Palo Alto, CA). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

EPRI has supported fuel bundle surveillance projects and fuel failure analyses of standard fuel designs that have been irradiated in commercial power reactors. These projects have included fuel rod puncturing activities to obtain fission gas release data and other nondestructive and destructive examinations that provide support-

ing information as to the amount of fission gas released. Measurements from 110 rods were reviewed in order to identify those features of the fuel rod design and of operating conditions that determine the amount of gas released. Pressurization of fuel rods to values used by the PWR vendors (~ 30 atm) is the most effective way of maintaining fission gas release at low values (<1%). Such low releases have been measured in fuel rods exposed through four cycles. In unpressurized designs there appears to be a burnup value beyond which high releases (>10%) can be expected. Gamma scanning is an effective nondestructive examination technique for estimating whether a rod has released little or much fission gas.

23458 (DOE/NE/34087—T1-Vol.2) **LWR extended burnup: fuel performance and utilization.** (American Nuclear Society, Lynchburg, VA. Virginia Section). 1982. Contract AC02-81NE34087. 295p. (CONF-820472—Vol.2). NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Separate abstracts are included for each of the papers presented concerning advanced fuel designs for achieving high burnup; extended burnup fuel in transient and off-normal operation; and impact of extended burnup on the fuel cycle.

23459 (DOE/NE/34087—T1-Vol.2, pp 5.5-5.19) **Design and development of KWU 18 x 18 PWR and 9 x 9 BWR fuel assemblies and their relevance to burnup increase.** Holzer, R.; Lill, G.; Aisch, F.W. (Kraftwerk Union AG, Erlangen, Germany). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

KWU has developed two advanced fuel designs, an 18 x 18 fuel assembly for PWR use and a 9 x 9 fuel assembly for BWR use. Both designs, being characterized by smaller rod diameters and reduced linear heat generation rates, have been qualified by extensive out-of-pile test programs and prototype assembly irradiation is just under way. To both designs a marked potential for burnup extension can be attributed. Among other effects, this is primarily due to a reduced corrosion rate in the PWR environment and to smaller fission gas release fractions from the fuel in both the PWR and the BWR design.

23460 (DOE/NE/34087—T1-Vol.2, pp 5.51-5.67) **Irradiation tests on barrier fuel in support of a large-scale demonstration.** Davies, J.H.; Rosenbaum, H.S.; Armijo, J.S.; Rosicky, E.; Esch, E.L.; Wisner, S.B. (General Electric Co., San Jose, CA). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The development of barrier fuel is briefly reviewed and the test program in support of the demonstration is outlined. Power ramp tests and a perforated rod test, performed in the Studsvik R2 reactor, are described in detail. The ramp tests have confirmed the high PCI resistance of the zirconium liner fuel design. Copper barrier fuel also outperformed the reference fuel, but the effectiveness of the copper barrier as a PCI remedy was diminished at higher exposures. Largely on the basis of the ramp test results, zirconium liner fuel was selected for the large-scale demonstration. The perforated rod test demonstrated that defective zirconium liner fuel could be successfully operated for a sustained period without severe degradation or secondary damage.

23461 (DOE/NE/34087—T1-Vol.2, pp 6.39-6.45) **BWR high burnup licensing assessment.** Wood, J.E.; Crowther, R.L.; Dix, G.E. (Nuclear Energy Business Operation, San Jose, CA). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Analytical studies have shown significant potential for enhanced BWR fuel cycle costs through implementation of fuel extended burnup. Prior to implementation of extended burnup, potential impacts on the core nuclear and thermal behavior as well as issues relating to the fuel material and mechanical integrity must be considered. This paper identifies some of the key potential issues relating to core nuclear and thermal behavior. Although no new phenomena are expected, implementation of extended exposure increases the challenge to core and system analytical models due to the increased complexity of the existing interactive physical phenomena.

23462 (DOE/NE/34087—T1-Vol.2, pp 6.67-6.74) **Risoe Fission Gas Project: an overview.** Knudsen, P. (Risoe National Lab., Roskilde, Denmark). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The Risoe Fission Gas Project has provided experimental data on fission gas release from high-burnup water reactor fuel. The data are well-characterized with respect to pre-irradiation measurement, irradiation and post-irradiation examination, thus enabling their use in fuel performance code validation. The experimental data were obtained with 12 Zircaloy clad UO_2 pellet fuel pins, irradiated in a test assembly to an average of 32,000 MWD/tU. Most of the fuel pins were submitted to short-term reirradiations at increased power levels (bump testing) in a test reactor, in order to simulate postulated power increases late in life. The burnup tests covered a range of bump terminal levels of 320-462W/cm (peak pellet), mostly with a hold time of 24 h. Extensive hot-cell examinations were performed of base-irradiated and bump-tested fuel pins.

23463 (DOE/NE/34087—T1-Vol.2, pp 7.1-7.11) **Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel.** Chesne, A.; Talmont, X. (Commissariat a l'Energie Atomique, Fontenay-aux-Roses, France). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

In order to evaluate the impact of extended burn up LWR fuels on the back end of the fuel cycle, a comparison of these fuels with standard ones has been made. As standard fuel one have considered 3.5% uranium enrichment with an irradiation of 33.000 $MWdt^{-1}$ while for high burn up fuels 4.5% uranium enriched with irradiation of 45,000 to 48,000 and 52,000 were choosen. Increased neutron emission of these last fuels may raised some problems for transport and reception. For these operations and the fuel dissolution a careful control of the fuel irradiation - then of the residual fissile uranium - is necessary. The α activity of the high burn up fuel will lead to an accelerate degradation of the organic solvent TBP used in the solvent extraction cycles. It could reduce their efficiency. Higher α activity and neutron emission of plutonium dioxide from these fuels are to be considered in the transport, storage and future uses of this material.

23464 (EPRI-NP—2728-SR) **Nondestructive evaluation program: progress in 1982.** Dau, G.J.; Armor, A.; Lapides, M.E.; Liu, S.N.; Oldberg, T.; Quinn, J.R. (Electric Power Research Inst., Palo Alto, CA (USA). Systems and Materials Dept.). Feb 1983. 395p. NTIS, PC A17/MF A01. Order Number DE83901877.

Portions are illegible in microfiche products.

This report presents a comprehensive review of the EPRI effort toward light water reactor inspection problems. Most of the report consists of contractor-supplied progress reports of each current project. An organizational plan of the program is presented in overview. Organization from several viewpoints is presented, e.g., in-service inspection operations, R & D personnel, and utility representatives. Information about the program organization is presented. Contractor-supplied progress reports of each current project are grouped by plant components - pressure vessel, turbine, nozzle, etc.

23465 **(EPRI-NP—2789-SR) Plant Materials Program: progress June 1981-May 1982.** Childs, W.; Cubicciotti, D.; Fox, M.; Giannuzzi, A.; Gilman, J.; Jones, R. (Electric Power Research Inst., Palo Alto, CA (USA). Systems and Materials Dept.). Feb 1983. 252p. NTIS, PC A12/MF A01. Order Number DE83901837.

Portions are illegible in microfiche products.

This is the second annual progress report of the Plant Materials Subprogram, which was organized in May 1980 to address corrosion-related materials problems in light water reactors. The first section of the report provides an overview of plant materials problems which have impact on plant availability. These include pipe and pressure vessel cracking, condenser leakage, turbine disc cracking, steam generator tube attack and cracking, and cracking of nickel alloy springs, beams and pins. The status and goals of research and development work related to each of these problems are reviewed briefly. Subsequent report sections provide more detailed reviews of significant progress in the relevant technical topic area: integranular stress corrosion cracking of austenitic stainless steels; environmentally-assisted cracking of carbon and low alloy steels; intergranular stress corrosion cracking of nickel-base alloys; and improved fabrication technology.

23466 **(EPRI-NP—2903) Comparison of COMETHE-IIIJ and FCODE-BETA fission gas-release predictions with measurements. Final report.** Lee, S.; Rayes, L.; Rumble, E.; Wheeler, D.; Woods, A. (Science Applications, Inc., Palo Alto, CA (USA)). Mar 1983. 63p. NTIS, PC A04/MF A01. Order Number DE83901825.

Portions are illegible in microfiche products.

This report describes a comparison of the Fission Product Gas Release (FGR) predictability of two LWR fuel rod modeling codes: COMETHE-IIIJ and FCODE-BETA. The comparison is made using 124 well characterized fuel rods with FGR measurements in the EPRI Fuel Performance Data Base.

23467 **(UCID—19474) Technical evaluation report on the adequacy of station electric-distribution-system voltages for the Millstone Nuclear Power Station, Units 1 and 2. Docket Nos. 50-245, 50-336.** Selan, J.C. (Lawrence Livermore National Lab., CA (USA)). 25 Mar 1983. Contract W-7405-ENG-48. 15p. NTIS, PC A02/MF A01. Order Number DE83009218.

This report documents the technical evaluation of the adequacy of the station electric-distribution-system voltages for the Millstone Nuclear Power Station, Units 1 and 2. The evaluation is to determine if the onsite distribution system, in conjunction with the offsite power sources, has sufficient capacity to automatically start and operate all Class 1E loads within the equipment voltage ratings under certain conditions established by the Nuclear Regulatory Commission. The analyses submitted demonstrate that adequate voltages will be supplied to the Class 1E equipment under the worst-case conditions analyzed.

2102 Power Reactors, Non-breeding, Light-water Moderated, Non-boiling Water Cooled

REFER ALSO TO CITATION(S) 23116, 23445, 23446, 23448, 23450, 23453, 23456, 23457, 23458, 23459, 23462, 23463, 23464, 23465, 23466, 23467, 23522, 23523, 23526, 23527, 23529, 23532, 23533, 23561, 23567, 23568, 23573, 23584, 23585, 23600, 23601, 23603, 23606, 23607, 23608, 23611, 23613, 23614, 23615, 23616, 23619, 23621, 23622, 23623, 23624, 23632, 23635, 23636, 23637, 23638, 23640, 23652, 23655, 23658, 23906, 23920, 23923

23468 **(ANL/NESC—776) COMPARE/MOD1A; transient flow with sinks & doors.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Gilbert, J.S. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048776.

Maxima of 100 volumes, 200 junctions, 5 mass and energy addition tables (blowdown sets), 10 variable area doors, 500 heat sink nodal points, 100 force-moment surfaces, 100 junctions with detailed loss coefficient information, 10,000 points plotted, 5 curves per plot Water temperature is restricted to the range of 273.16 to 620 degrees K. Reference report, LA-7199-MS.

COMPARE-MOD1 performs transient analysis of the thermodynamic conditions in zero velocity or stagnant volumes connected by flowing junctions with provision for mass and energy addition. Volume thermodynamics and junction flows are for homogeneous mixtures of: steam, two-phase water to its triple point, any three perfect gases, or combinations of the above. Vent flow can be based on the Moody equation, compressible polytropic orifice flow, and an incompressible subelement inertial relationship. Variable area doors and heat sinks can be modeled. Capabilities are incorporated to provide for accounting of loss coefficient detail, calculation of forces and moments, and plotting of results. The program was written to perform transient subcompartment analysis of nuclear power plants, including those with ice condensers.CDC7600,CYBER175; FORTRAN IV; LASL FTN operating system (similar to CDC SCOPE) (CDC7600), NOS1.3 (CDC CYBER175); 157,000 (octal) words on a CDC7600; 153,000 (octal) words on a CDC CYBER175.

23469 **(CONF-810625—23) Flow-induced vibration of a curved tube array subject to liquid cross flow.** Jendrzejczyk, J.A.; Chen, S.S. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008510.

From ASME PVP conference; Denver, CO, USA (21 Jun 1981).

Portions are illegible in microfiche products.

This paper presents the results of tests of a curved-tube array in air, in stationary water, and in flowing fluid. A curved-tube array can be subjected to fluidelastic instability which is similar to that in a straight-tube array. However, in a curved-tube array, tube natural frequencies are different in two directions and there are frequency variations among different tube rows; the critical-flow velocity and instability mode are not the same as those of the corresponding straight-tube array. Based on the experimental data, a mathematical consideration, it can be concluded that some of the instability modes will not occur in a curved-tube array; therefore, the critical-flow velocity established for straight-tube arrays can be considered as a conservative estimate for a corresponding curved-tube array.

23470 **(DLCS—5000482) Shippingport Atomic Power Station. Quarterly operating report, fourth quarter 1982.** (Duquesne Light Co., Shippingport, PA (USA)). 1982. Contract AC11-76PN00292. 27p. NTIS, PC A03/MF A01. Order Number DE83008075.

At the beginning of the fourth quarter of 1982, the Shippingport Atomic Power Station was operating at the maximum allowable power level with the 1A, 1B, 1C, and 1D Reactor Coolant loops and the 1AC and 1BD purification loops in service. On October 1, 1982, at 1001 hours, the reactor was scrammed and the Station shutdown for End-of-Life testing and defueling. The irradiated PWR Core 2 barrel and miscellaneous refueling tools remained in storage under shielding water in the deep pit. The LWBR Core has generated 28,730.41 EFPH from startup through the final scram from power on October 1, 1982 at 1001 hours. The Reactor Coolant System average leak rate for this quarter, when it could be obtained, was 10.8 gallons per hour. There was no radioactive liquid discharges from the Radioactive Waste Processing System to the river this quarter.

23471 **(DOE/ET/34010—7) Evaluation and demonstration of methods for improved fuel utilization: Fort Calhoun spent-fuel-pool cleanup following a spill of hydraulic fluid containing glycol.** (C-E Power Systems, Windsor, CT (USA); Omaha Public Power District, NE (USA)). Nov 1982. Contract AC02-79ET34010. 49p. (CEND—406). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83009723.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The objective of this Department of Energy sponsored program is to demonstrate increased burnup for Combustion Engineering's 14 x 14 fuel design. The program includes the irradia-

tion of high burnup and low leakage demonstration assemblies with low leakage used to enhance fuel management flexibility for achieving high burnup. These demonstrations are being performed in the Fort Calhoun reactor located near Omaha, Nebraska. This report covers an unplanned activity resulting from a spill of hydraulic fluid from fuel inspection equipment into the spent fuel pool during the End of Cycle 6 (EOC6) fuel inspection in October 1981. This event resulted in a cleanup effort to restore the visibility of the pool which was degraded subsequent to the event. The efforts described in this report were successful in restoring the clarity of the pool to its prespill condition. This report describes the consequences of the spill, details the cleanup effort and presents recommendations to minimize the consequences of such a spill in the future.

23472 (DOE/ET/34010—8) **Evaluation and demonstration of methods for improved fuel utilization. Sixth semi-annual progress report, April 1, 1982-September 30, 1982.** (C-E Power Systems, Windsor, CT (USA); Omaha Public Power District, NE (USA)). Dec 1982. Contract AC02-79ET34010. 39p. (CEND—408). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83009718.

This report covers the progress during the period from April 1982 through September 1982. During this period the four SAVFUEL demonstration assemblies continued their third (and last) exposure cycle, simulating the SAVFUEL power cycle. In addition, one extended burnup demonstration assembly, which has been reinserted for a sixth exposure cycel has accumulated a peak rod average burnup of 54.7 GWD/T and is projected to accummulate 56.3 GWD/T at the end of the cycle. Poolside examinations have previously been completed on fuel assemblies having achieved three, four and five cycles of irradiation. Rods which were removed from these assemblies were shipped to the hot cell for further examination. Plans were made for the hot cell examination as well as for the final poolside examination.

23473 (DOE/ET/34212—36) **Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982.** Newman, L.W.; Rombough, C.T.; Thornton, T.A. (Babcock and Wilcox Co., Lynchburg, VA (USA)). Aug 1982. Contract AC02-78ET34212. 96p. (BAW—1681-2). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83008575.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Babcock and Wilcox Company, Duke Power Company, and the US Department of Energy are participating in an extended-burnup program for pressurized water reactors that will demonstrate an advanced fuel assembly design. This advanced fuel assembly will use a UO_2-Gd_2O_3 burnable-poison fuel mixture along with other state-of-the-art fuel performance and uranium utilization-enhancing design features that include annular pellets, annealed guide tubes, Zircaloy intermediate grids, and removable upper end fittings. Comparisons of the thermal properties of UO_2-Gd_2O_3 specimens containing 2.98, 5.66, and 8.50 wt % Gd_2O_3 with UO_2 specimens showed that thermal conductivity is the only thermal parameter significantly affected by the addition of Gd_2O_3. The milling steps used to prepare UO_2-Gd_2O_3 powder result in a powder that is more active than standard UO_2 powder. As a result, UO_2-Gd_2O_3 fuel has shown more variability than UO_2 fuel in as-sintered theoretical density and densification behavior. However, a poreforming material, added to the UO_2-Gd_2O_3 powder mixture before sintering, can be used to achieve the desired density. Measured results from critical experiments were compared with predicted data and confirmed the accuracy of the standard two-group diffusion theory model for predicting global and discrete UO_2-Gd_2O_3 effects when cross-section input is appropriately adjusted. The preliminary first two fuel cycles for lead test assemblies of the advanced design were developed. Irradiation of the lead test assemblies is scheduled to begin in 1983 in Duke Power Company's Oconee Unit 1. An intercalibrated movable incore detector system will be used to monitor the performance of the test assemblies during irradiation.

23474 (DOE/NE/34087—T1-Vol.1, pp 1.5-1.20) **Operating experience with combustion engineering fuel at high burnups.** Andrews, M.G.; Hatfield, S.C.; Ruzauskas, E.J. (Combustion Engineering, Inc., Windsor, CT). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The need to systematically accumulate technical support for the operation of LWR fuel rods to extended burnups is based on the obvious advantage to utilities when more energy is generated from a unit of fuel. Confidence in reliability and licensability has been strengthened by the irradiation and inspection of lead test assemblies in a program co-sponsored by EPRI in the Calvert Cliffs reactor and by DOE in the Ft. Calhoun reactor. The programs have been successful in demonstrating reliable performance of C-E standard fuel designs to 46 GWd/MtU. The results of the surveillance inspections at the spent fuel pools are reported and confirm that the design models are appropriate to these extended levels. All aspects of the fuel behavior show only gradual and predictable changes with burnup, and no unforeseen effects have been revealed which could limit the life of C-E's standard fuel assembly.

23475 (DOE/NE/34087—T1-Vol.1, pp 1.21-1.37) **Fuel performance characteristics at extended burnup.** Wilson, H.W.; Roberts, E.; Melehan, J.B.; Kaiser, R.S.; Bein, J.D.; Kunishi, H. (Westinghouse Electric Corp., Pittsburgh, PA). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Westinghouse experience in the high burnup fuel performance area is summarized. The specific programs involved are discussed along with the key results and conclusions in several areas of interest to high burnup applications. These results can be used to identify the types of data needed to support high burnup operation and identify any considerations which might limit high burnup operations. The status and characteristics of the individual programs are discussed. The key considerations for high burnup are then discussed along with the appropriate results for each area from the individual programs. The evaluation shows that data are needed at operating conditions (power and burnup) which bound that expected during operation at extended burnups. It is shown that the various completed and on-going programs are providing the data necessary to support high burnup operations. Based on the existing data, none of the key considerations appear to pose a limitation which would prevent achieving the burnups foreseen for the future.

23476 (DOE/NE/34087—T1-Vol.1, pp 1.39-1.57) **Extended burnup fuel performance.** Coleman, T.A. (Babcock and Wilcox, Lynchburg, VA); Bain, G.M.; Pyecha, T.D.; Tulenko, J.S.; Snipes, R.G.; Kortheuer, J.D. 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736. Contract AC02-78ET34212.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Oconee 1, the first large commercial nuclear power plant designed by Babcock and Wilcox and operated by Duke Power Company, began operation in early 1973. Since this time, B and W's fuel experience and fuel performance data base have continued to grow. More than 600,000 fuel rods have been irradiated, assembly burnups of 40,000 MWd/mtU have been attained, and an assembly is currently being irradiated to a burnup in excess of 50,000 MWd/mtU. Detailed nondestructive and destructive examinations have been performed on one-, two-, three-, and four-cycle fuel, verifying excellent fuel performance through burnups to 40,000 MWd/mtU. The results of these examinations are summarized and discussed in this paper.

23477 (DOE/NE/34087—T1-Vol.1, pp 1.59-1.70) **High burnup performance of Exxon Nuclear Company fuel in the H. B. Robinson pressurized water reactor.** Exarhos, C.A.; Bentley, D.E.; Blair, T.R.; VanSwam, L.F.; Wahlquist, F.P. (Exxon Nuclear Co., Richland, WA). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Four 15 x 15 assemblies of Exxon Nuclear Company's standard design have successfully been irradiated to an assembly average burnup in excess of 40,000 MWD/MTU in the H. B. Robinson PWR. Data collected at poolside after each of the four cycles of exposure is reported. Fuel performance has been evaluated on the basis of visual examinations and rod spacing measurements after each cycle, together with rod growth, rod diameter, and assembly growth measurements from the third and fourth cycles. The data supports trends established at low burnup, and indicates no obstacles to the routine irradiation of ENC PWR fuel to burnup levels in the range achieved.

23478 (DOE/NE/34087—T1-Vol.1, pp 2.3-2.19) **Application of extended burnup: a utility perspective.** Lippold, W.J.; Steelman, J.P. (Baltimore Gas and Electric Co., MD). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Extended Burnup in combination with 18-month cycles was evaluated in order to develop a basis for a decision to transition both Calvert Cliffs Units to extended burnup 18 month cycles. A series of coarse mesh fuel management schemes parametric in cycle burnup were developed. They were subject to constraints on core power distribution, moderator temperature coefficient, enrichment, and discharge burnup. Fuel management data was combined with estimates of future fuel cycle component prices and other contractual constraints to yield fuel cycle cost estimates for each scheme. Nuclear fuel cycle cost and generation estimates were integrated with similar estimates from other Baltimore System plants to yield the system cost for each scheme. When these results were combined with judgements about technical uncertainties a decision was made to implement an extended burnup 18-month cycle program.

23479 (DOE/NE/34087—T1-Vol.1, pp 2.31-2.42) **High burnup irradiation programs of the FRAGEMA 17 x 17 standard fuel.** Dehon, C. (FRAGEMA, Lyon, France); Dangouleme, D.; Stora, J.P. 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

While two regions of FRAGEMA 17 x 17 fuel assemblies have completed their third cycle of irradiation, mid-1981, in the FESSENHEIM reactors and have reached assembly average burnup of 37,000 MWd/mtU, special irradiation programs leading to assembly average burnup in excess of 50,000 MWd/mtU are being implemented by FRAGEMA and E.D.F. The objective of increasing assembly discharge burnup beyond the presently demonstrated figure of 37,000 MWd/mtU should contribute to better uranium utilization and a possible fuel cycle cost reduction in the E.D.F. reactors. Two in-reactor high burnup irradiation test programs are being conducted in France. These test programs are described.

23480 (DOE/NE/34087—T1-Vol.1, pp 2.43-2.48) **Fuel performance experience of high burnup fuel in RWE reactors.** Wolff, U.; Heckermann, H.; Hoffmann, H.; Warnecke, H. (Rheinisch-Westfaelisches Elektrizitaetswerk AG, Essen, Germany). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Fuel performance of PWR assemblies of current design up to burnup of 40 GWd/tU indicated no abnormal behavior of increased failure rates. Fuel rod growth and corrosion data show an increase of the scatter with burnup requiring a statistical significant data base as a design basis. Fission gas release data indicate a slight increase of the release with burnup; however, the absolute level was very low. Based on economic considerations and taking into account the current fuel performance experience, the development of new design concepts for extended burnup with the following characteristics was initiated: reduced linear power, i.e., 9 x 9 for BWR and 18 x 18 for PWR to reduce fission product release and increase reliability, use of Gadolinia as burnable poison in PWR for reactivity control, and use of annular pellets. Based on present experience, burnup up to 50 GWd/tU seems feasible for new nuclear power plants as well as for plants already being in operation.

23481 (DOE/NE/34087—T1-Vol.1, pp 3.25-3.41) **Fission gas release from PWR fuel rods under conditions of normal operation and power ramping.** Pati, S.R.; Freeburn, H.R.; Corsetti, L.V. (Combustion Engineering, Inc., Windsor, CT). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Measurements of fission gas release are presented for helium-pressurized fuel rods of PWR design which were all fabricated using Zircaloy-4 tubing as the clad material and UO_2 fuel in solid pellet form. Various fuel microstructures are included which have distinct differences in grain size, density, porosity distribution and propensity for densification in reactor. One group of gas release measurements are from fuel rods irradiated through one to four cycles at Calvert Cliffs I. Another group of gas release measurements is presented for pressurized PWR fuel rods which have undergone fast power ramps in a test reactor at Studsvik, as part of an internationally sponsored program, following up to three cycles of power reactor irradiation. The peak linear heat ratings achieved during ramping are well above the normal heat ratings typical of PWR operation.

23482 (DOE/NE/34087—T1-Vol.1, pp 3.43-3.57) **Fission gas release at high burnup.** Kauffmann, Y. (Commissariat a l'Energie Atomique, Grenoble, France); Pointud, M.; Vignesoult, N.; Atabek, R.; Baron, M. 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

A particular attention has to be devoted to the fission gas release in PWR fuel elements to extend the mean burnup of unloaded assemblies. Residual gas concentration measurements by heating and X microanalysis were therefore carried out respectively on particles from the TANGO program and on well-characterized (manufacture, irradiation history) fuel rod sections. A xenon release threshold temperature of 1250 +- 100°C was determined, whatever the type of oxide and irradiation history, within the 18,000-45,000 MWd t^{-1} (U) burnup range. Total analyses of gas released in the fuel rods show that, so far, under PWR operating conditions, the fraction given off is less than 1% up to an average burnup of 35,000 MWd t^{-1} (U). The fission gas release ought not to be a drawback to burnup extension.

23483 (DOE/NE/34087—T1-Vol.1, pp 4.5-4.17) **International over-ramp project at Studsvik.** Hollowell, T.E. (Consumers Power Co., Jackson, MI); Knudsen, P.; Mogard, H. 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

A total of thirty-nine PWR design fuel rods have been ramp tested under fast power increase (100 W/cm min) in the Studsvik R2 test reactor after base irradiations in the Obrigheim and BR-3 power reactors. Burnup levels tested ranged from 12 to 31 MWd/kg U. Failure thresholds have been established within particular groups of rods having nearly identical design and base irradiation history. The failure threshold has a lower value of approximately 420 W/cm at burnups around 25 MWd/kg U. Differences in design

and operating parameters such as pellet-cladding gap, burnup, helium pre-pressurization level, enrichment, clad wall thickness, and base irradiation history have provided differences in observed rod performance. The location of the lower failure threshold coincides with corresponding findings reported from other LWR fuel test programs.

23484 (DOE/NE/34087—T1-Vol.1, pp 4.19-4.34) **High burnup effects on the pellet-cladding interaction phenomenon.** Atabek, R. (CEN/Saclay, France); Vignesoult, N.; Joseph, J.; Dehon, C. 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

In the course of their common research and development program, CEA and Fragema are devoting an important research effort to the pellet-cladding interaction problem, with the purpose of defining the values of the main parameters of practical relevance to the interaction, and of understanding the basic mechanisms, both mechanical and chemical, at work in the interaction phenomenon. More than 30 rods have been ramp-tested in the CEA experimental reactors SILOE and OSIRIS, in particular 10 rods with burnups ranging from 33,000 to 43,000 MWd/tU, three of which were refabricated by the FABRICE process. All tests were performed with a standard ramping rate of 50 $W/cm^{-1}/min^{-1}$. The upper limit for non-failure (eddy-current test detection) has been established to lie between 380 and 390 W/cm^{-1} for burnups between 33,000 and 43,000 MWd/tU and cold initial internal pressures of 1 and 35 bars. The comparison of the upper limits with the PROFIT model shows a margin from 30 to 40 W/cm^{-1}. In order to evaluate the purely mechanical aspects of the PCI failure mechanism, the cladding stresses are calculated with the TITUS code.

23485 (DOE/NE/34087—T1-Vol.1, pp 4.39-4.55) **Densification, swelling, and microstructures of LWR fuels through extended burnups.** Pati, S.R.; Fuhrman, N. (Combustion Engineering, Inc., Windsor, CT). 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Under the joint sponsorship of the Electric Power Research Institute (EPRI) and Combustion Engineering (C-E) the densification and swelling behavior of UO_2 pellet fuel, exposed for up to 4 cycles in Calvert Cliffs-I, has been characterized and correlated with pellet microstructure and fuel rod performance. Data are included from three different fuel types, two nondensifying (93% TD and 95%) and one densifying (93% TD) operated under typical PWR conditions, i.e., centerline temperatures of less than 1300C. Irradiated fuel specimens, representing local burnups estimated from ^{137}Cs gamma scans, and ranging to 50 GWd/mtU, were subjected to mercury pycnometric measurements. The resulting density data were subjected to the respective as-fabricated densities to generate sets of data on volume change vs. burnup for each fuel type.

23486 (DOE/NE/34087—T1-Vol.1, pp 4.57-4.70) **French analytical experience on high burnup performance of PWR fuel elements under steady-state conditions.** Bruet, M. (CEN/Grenoble, France); Atabek, R.; Houdaille, B.; Baron, D. 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

With the aim of increasing the discharge burnup of PWR fuel assemblies, an important program has been undertaken by the CEA and Fragema in order to study the fuel rod component behavior at high burnup. Hydrostatic density measurements performed on different types of UO_2 fuel rod pellets (DCN and DCI oxide), irradiated under PWR representative conditions, allow the determination of the rate of internal matrix swelling. A mean value of 0.8% per 10^4 $MWdt^{-1}$ (U) up to a peak burnup of 45,000 $MWdt^{-1}$ (U), is deduced from these experimental data. These results are consistent with those obtained on UO_2 DCN spheres (TANGO experiments), irradiated under quasi-isothermal and stress-free conditions. The Zircaloy-4 hard recrystallized cladding behavior remains satisfactory with respect to creep and growth throughout irradiation.

23487 (DOE/NE/34087—T1-Vol.1, pp 4.71-4.87) **Observations and analyses of the corrosion behavior of PWR fuel.** Garzarolli, F. (Kraftwerk Union AG, Erlangen, Germany); Suchy, P.; Smerd, P.G. 1982. NTIS (US Sales Only), PC A16/MF A01. Order Number DE82021736.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Measurements to determine the extent of waterside corrosion on fuel rods from four KMU PWRs were conducted in spent fuel pools using a non-destructive eddy current probe. These fuel rods had been irradiated for one to four cycles and had accumulated average burnups which ranged from 3300 to 35,600 MWd/mtU. In addition, some rods with average burnups of 11,200 to 41,600 MWd/mtU were examined in the hot cell using a similar non-destructive eddy current technique as well as standard destructive procedures. A reasonable correlation was found between oxide layer thickness measurements and temperatures calculated by using a local heat transfer coefficient. The effect of spacer grids on the fuel rod axial temperature profile and the consequent corrosion behavior were also modeled. The data show that the irradiation environment of a PWR increases corrosion and that the increase varies from reactor to reactor and from cycle to cycle.

23488 (DOE/NE/34087—T1-Vol.2, pp 5.21-5.32) **Development of an extended burnup fuel assembly.** Walton, L.A. (Babcock and Wilcox Co., Lynchburg, VA); Matheson, J.E.; Allen, R.J.; Mansell, A.G.; Dow, B.L. 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866. Contract AC02-78ET34213.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

An advanced extended burnup fuel assembly is being developed to replace the current fuel assembly design employed in pressurized water reactors. The fuel assembly is designed for burnups greater than 60 GWd/mtU and has overall fuel performance and utilization characteristics which are significantly improved over the current generation fuel. Annular fuel pellets are utilized in the fuel rod design to prevent the buildup of excessive internal pressure inside the rod due to the increased fission gas release during extended burnup operation. Annealed guide tubes are used to reduce irradiation induced growth of the fuel assembly. A removable upper end fitting incorporating torsion springs for greater hold-down is being used. The removable upper end fitting permits remote repair of irradiated fuel assemblies. Four lead test assemblies containing many of the features proposed for the new design are under irradiation in Arkansas Power and Light Company's ANO-1 reactor.

23489 (DOE/NE/34087—T1-Vol.2, pp 5.33-5.50) **Duplex fuel: British and Danish experience and evaluation.** Ainscough, J.B.; Councill, D.N.; Howl, D.A.; Jensen, A.; Misfeldt, I. 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The duplex, or dual enrichment, fuel pellet comprises an outer zone of enriched UO_2 surrounding an inner core of natural or depleted UO_2. Two types of duplex pellet have been tested; in the first the two components are co-compacted during fabrication while in the second they remain as separate rings and cores. An example of the second type is the Danish LOWI design, in which, in addition to the low operating temperatures associated with all duplex fuel, the gap between the ring and core is intended to improve further the pellet-clad interaction (PCI) behavior of the fuel. This paper describes the design and fabrication of both types of duplex fuel, and Danish and British irradiation experience. Experiments show clearly some of the benefits expected of duplex fuel: lower fuel temperature, reduced fission gas release, and improved behavior at power ramps. However most of the irradiation experience has been at comparatively low burn-up.

23490 (DOE/NE/34087—T1-Vol.2, pp 6.47-6.66) **PWR high burnup licensing assessment.** Franklin, D.G. (Electric Power Research Inst., Palo Alto, CA); Strasser, A.A. 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The nuclear industry is seriously considering extending the burnup of pressurized water reactor (PWR) fuel from 35 GWD/MTU to 50 GWD/MTU. The effects of this extension on the licensing of fuel are reviewed. During normal operation the failure rate of extended burnup fuel is not expected to be significantly higher than for current fuel, and is certainly less than the reactor system is designed to handle. For safety analyses, the limiting cases will continue to occur at burnups of less than 20 GWD/MTU when fuel reactivity and power are high, although the burnups of the limiting cases may increase. Judicious design of fuel cycles, enrichment distributions, and burnable poisons can retain adequate margins to limits by minimizing peaking factors that can result from the higher enrichments and fission product inventories associated with higher burnups.

23491 (DOE/NE/34087—T1-Vol.2, pp 7.13-7.18) **Extended burnup implementation: assessment and experience.** Smith, M.L. (Virginia Electric and Power Co., Richmond); Dziadosz, D.; Kapil, S.K.; Miller, R.S. 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

Virginia Electric and Power Company evaluations of extended burnup fuel management schemes have indicated an approximate 12% reduction in fuel cycle cost for an 18-month cycle with 45,000 MWd/mtU region average burnup. Preliminary analysis also indicated that low-leakage loading patterns would be feasible for this fuel management scheme. Although Technical Specification changes for the Surry and North Anna Nuclear Units were submitted to the NRC consistent with this fuel management scheme, approved Technical Specification revisions were limited to a burnup level of 37,000 MWd/mtU pending NRC review of fuel failure rates at higher burnup levels. An ongoing DOE-sponsored program at Surry has demonstrated acceptable fuel performance at 42,500 MWd/mtU.

23492 (DOE/NE/34087—T1-Vol.2, pp 7.25-7.37) **Burnable poisons for extended burnup fuel management: present and future.** Newman, L.W. (Babcock and Wilcox, Lynchburg, VA); Spetz, S.W.; Thornton, T.A.; Wittkopf, W.A.; Badruzzaman, A.; Harrison, J.L.; Wrona, B.J.; Kortheurer, J.D. 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866. Contract AC02-78ET34212.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

In 1980 the US Department of Energy selected Duke Power Company with Babcock and Wilcox as subcontractor to develop urania-gadolina fuel as an alternate to boron-based poison. The objective of this gadolinia program is to establish, implement, and verify the technology needed to routinely use urania-gadolina fuel for extended burnup application in pressurized water reactors. The technology to be developed covers the following area: (1) fuel fabrication process development; (2) material properties evaluation; (3) nuclear model development and verification; and (4) lead test assembly design, irradiation, and examination. Significant progress has been made in all areas and is reported.

23493 (DOE/NE/34087—T1-Vol.2, pp 7.39-7.48) **Fuel management schemes for PWR extended burnup fuel cycles with gadolinium.** Harris, R.; O'Donnell, P.; Bagnal, C. (Combustion Engineering, Inc., Windsor, CT). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

This paper summarizes the fuel management phase of a US Department of Energy sponsored study on the use of gadolinium in PWR extended-burnup fuel cycles. The objective of this phase is to develop prototypical reload designs in which gadolinia burnable poison rods are used to facilitate fuel management schemes that achieve extended burnup. Annual and 18-month, low leakage, extended-burnup cycles (batch average discharge burnup of 51.0 MWd/Kg) with gadolinia are discussed. These are compared to an annual standard burnup cycle (batch average discharge burnup 30.5 MWd/kg) employing conventional OUT-IN fuel management with no shims and to an annual, extended-burnup cycle employing low leakage fuel management with boron-10 shims. Nuclear design and safety related characteristics are described and compared among these fuel cycles.

23494 (DOE/NE/34087—T1-Vol.2, pp 7.49-7.59) **High burnup fuel cycle characteristics of conventional and low leakage fuel management schemes for Arkansas Nuclear One Unit 2.** Freeman, R.; Greene, M.; Matzie, R.; Decher, U. (Combustion Engineering, Inc., Windsor, CT). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

This paper presents analysis results from a US Department of Energy sponsored program to develop and demonstrate fuel designs and fuel management practices which facilitate increased burnup. The overall program consists of lead assembly demonstrations of Combustion Engineering's current 16 x 16 fuel design and advanced fuel designs, and analyses to assure that these fuel designs and fuel management practices can be successfully implemented in the ANO-2 reactor. The program is being conducted by Arkansas Power and Light and Combustion Engineering. Results presented in this paper consist of analyses of high burnup conventional and low leakage fuel management schemes which are judged to be achievable with the current fuel design.

23495 **(EGG-FM—5487) Development of an improved-contact liquid-level probe for pressurized reactor vessels.** Kelsey, P.V. Jr. (Idaho National Engineering Lab., Idaho Falls (USA)). Sep 1982. Contract AC07-76ID01570. 96p. NTIS, PC A05/MF A01. Order Number DE83008409.

Electrical-conductivity-based probes for liquid level sensing show promise for pressurized water reactor environments, but have exhibited frequent bond failures at the ceramic/metal interfaces. A program to characterize and improve the interface behavior has been completed successfully, and has provided data for optimizing fabrication parameters, as well as general information on glass-to-metal bonding in a superalloy/silicate-glass system. The materials studied were Inconel X-750 and a barium silicate glass containing minor amounts of TiO_2, CeO_2, As_2O_3, Bi_2O_3, and Al_2O_3.

23496 **(EGG-TMI—6181) Interim report on the TMI-2 purification filter examination.** Mason, R.E.; Hobbins, R.R.; Cook, B.A.; MacDonald, P.E. (Idaho National Engineering Lab., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 137p. NTIS, PC A07/MF A01. Order Number DE83009199.

Filters from the purification/makeup system of the Three Mile Island Unit 2 Reactor were examined after the March 28, 1979, accident to determine the character of the debris transported to the filters. The general condition of the filters is presented. Material was removed from the filters and examined. The elemental and radionuclide makeup of the debris is discussed. Distribution of particle size and shape is presentd for some of the material examined. This is an interim report. When the investigation is completed, another report summarizing all of the data will be issued.

23497 **(EPRI-NP—2815) Cleaning steam generators off-line (soaking) with chelants. Final report.** Charles, R.G.; Cleary, J.G. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center). Feb 1983. 232p. NTIS, PC A11/MF A01. Order Number DE83901857.

This report discusses the work done on EPRI program S149-1. In this program the feasibility of cleaning steam generators off line with organic chelants as a means of arresting denting corrosion was investigated. The rationale behind this program is to make use of those periods during which nuclear steam generators are in cold shutdown or wet layup to carry out a low-temperature soak with a combined chelant-inhibitor solution in order to dissolve some of the magnetite which has built up in crevices and to concomitantly remove entrained corrodents such as chloride ion. It was hoped that these soaks would be effective in reducing carbon steel support plate corrosion which produces tube denting.

23498 **(EPRI-NP—2848) EPRI/B and W cooperative program on PWR fuel-rod performance. Final report.** Papazoglou, T.P.; Davis, H.H. (Babcock and Wilcox Co., Lynchburg, VA (USA). Lynchburg Research Center). Mar 1983. 161p. NTIS, PC A08/MF A01. Order Number DE83901870.

Portions are illegible in microfiche products.

Zircaloy-4 fuel cladding specimens were irradiated in a fueled and non-fueled condition for two and four cyles of irradiation, respectively, in the Oconee 2 reactor. The purpose of this long-term surveillance program was to study the in-reactor performance of four Zircaloy-4 cladding types with distinctly different properties, in combination with two types of UO_2 fuel pellets. The cladding types included Sandvik Special Metals tubing in the cold-worked/stress relieved and cold-worked/recrystallized conditions, and German VDM cladding with two different anneal temperatures. The fuel pellets included a conventional densifying pellet type, and a special (shorter) stable pellet type intended to reduce pellet-clad mechanical interaction. The irradiation growth and creep under compressive stress of the above cladding types were studied and followed up to fluences of 1.3×10^{22} n/cm^2 ($E > 0.1$ MeV).

23499 **(EPRI-NP—2872) Thermal-hydraulic code qualification: ATHOS2 and data from Bugey 4 and Tricastin 1. Final report.** Masiello, P.J. (JAYCOR, San Diego, CA (USA)). Feb 1983. 117p. NTIS, PC A06/MF A01. Order Number DE83901875.

Portions are illegible in microfiche products.

Measured data from steam generators at the Bugey 4 and Tricastin 1 nuclear power plants operated by Electricite de France (EdF) have been used in the qualification of the ATHOS2 computer code. ATHOS2 is a three-dimensional, two-phase thermal-hydraulic code for the steady-state and transient analysis of recirculating-type steam generators. Predicted data for circulation ratio and secondary fluid temperature just above the tube sheet have been compared with corresponding data measured by EdF during on-site testing of Westinghouse Model 51A (Bugey 4) and 51M (Tricastin 1) steam generators. Comparative analyses have been performed for steady-state operating conditions at five power levels for each plant installation. The transient capabilities of the ATHOS2 code were examined in the simulation of an open-grid (load reject from 100% power) test conducted at Bugey 4. Results show that predicted data for secondary fluid temperature at eight locations just above the tube sheet are typically within 1.5°C of measured data.

23500 **(EPRI-NP—2877) Examination of Tube Samples 21-46 and 28-45 from the Ginna Nuclear Plant for intergranular attack.** Sarver, L.W.; Pardue, E.B.S. (Babcock and Wilcox Co., Alliance, OH (USA). Research Center). Feb 1983. 254p. NTIS, PC A12/MF A01. Order Number DE83901868.

Portions are illegible in microfiche products.

This work was undertaken to obtain metallurgical and deposit chemistry data from steam generator tube samples (from R.E. Ginna Nuclear Plant) afflicted with Intergranular Corrosion Attack (IGA) to aid in the selection of relevant corrosion-testing environments for EPRI Research Project 1618-2 investigation of the mechanism of IGA. Tube samples were characterized nondestructively in-situ and after removal. These results were compared with results of subsequent destructive metallographic analysis. Optical and scanning electron microscpy methods were utilized for characterization of surfaces.

23501 **(EPRI-NP—2887-Vol.1) Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report.** Hopkins, G.W.; Lee, A.Y.; Mendler, O.J. (Westinghouse Electric Corp., Forest Hills, PA (USA). Nuclear Technology Div.). Feb 1983. 275p. NTIS, PC A12/MF A01. Order Number DE83901871.

Portions are illegible in microfiche products.

As part of the EPRI/Westinghouse Project S168-1, Westinghouse was contracted to conduct steady-state and transient tests on the Westinghouse Model Boiler No. 2 (MB-2) steam generator test model at the Engineering Test Facility in Tampa, Florida, and to use the data obtained in these tests for the verification of the ATHOS2 (an updated version of URSULA2) code developed for EPRI by CHAM of North America, Inc. This document presents a description of: (1) the model boiler and the associated test facility; (2) the ATHOS2 code analytical model of MB-2; (3) the tests performed for the code verification program; (4) the comparisons of the test data with ATHOS2 calculations; and (5) recommendations for improving the ATHOS2 code.

23502 **(EPRI-NP—2887-Vol.2) Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report.** Hopkins, G.W.; Lee, A.Y.; Mendler, O.J. (Westinghouse Electric Corp., Forest Hills, PA (USA). Nuclear Technology Div.). Feb 1983. 596p. NTIS, PC A25/MF A01. Order Number DE83901874.

Portions are illegible in microfiche products.

As part of the EPRI/Westinghouse Project S168-1, Westinghouse was contracted to conduct steady-state and transient tests on the Westinghouse Model Boiler No. 2 (MB-2) steam generator test model at the Engineering Test Facility in Tampa, Florida, and to use the data obtained in these tests for the verification of the ATHOS2 (an updated version of URSULA2) code developed for EPRI by CHAM of North America, Inc. This document presents a description of (1) the model boiler and the associated test facility, (2) the ATHOS2 code analytical model of MB-2, (3) the tests performed for the code verification program, (4) the comparisons of the test data with ATHOS2 calculations, and (5) recommendations for improving the ARHOS2 code.

23503 **(EPRI-NP—2887-Vol.3) Thermal and hydraulic code verification: ATHOS2 and model boiler No. 2 data. Volume 3. Final report.** Hopkins, G.W.; Lee, A.Y.; Mendler, O.J. (Westinghouse Electric Corp., Forest Hills, PA (USA). Nuclear Technology Div.). Feb 1983. 623p. NTIS, PC A99/MF A01. Order Number DE83901878.

Portions are illegible in microfiche products.

As part of the EPRI/Westinghouse Project S168-1, Westinghouse was contracted to conduct steady-state and transient tests on the Westinghouse Model Boiler No. 2 (MB-2) steam generator test model at the Engineering Test Facility in Tampa, Florida, and to use the data obtained in these tests for the verification of the ATHOS2 (an updated version of URSULA2) code developed for EPRI by CHAM of North America, Inc. This document presents a description of (1) the model boiler and the associated test facility, (2) the ATHOS2 code analytical model of MB-2, (3) the tests performed for the code verification program, (4) the comparisons of the test data with ATHOS2 calculations, and (5) recommendations for improving the ATHOS2 code.

23504 **(GEND—030-Vol.1) Quick Look inspection: report on the insertion of a camera into the TMI-2 reactor vessel through a leadscrew opening.** (Bechtel Northern Corp., Gaithersburg, MD (USA)). Mar 1983. Contract AC07-76ID01570. 169p. NTIS, PC A08/MF A01. Order Number DE83009354.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The purpose of the insertion of a camera into the reactor vessel through a leadscrew opening, known as the Quick Look, was to visually inspect a portion of the plenum and fuel inside the TMI-2 reactor vessel in order to make an assessment of their condition. This was accomplished by uncoupling the center control rod drive mechanism (CRDM) leadscrew from the control rod assembly and removing the leadscrew from the CRDM, resulting in an access path to a plenum guide tube and to the core region. This report

describes the preparations and plant modifications required to accomplish this Quick Look. Additionally, the report summarizes the containment entries, data collected, and the observations from the camera inspections. As a result of the Quick Look, two general conclusions can be made: (a) although a significant amount of debris was observed, plenum distortion was not apparent, and (b) the top center of the core was observed in the form of a loose rubble bed approximately 5 feet below the design location.

23505 **(NUREG/CR—3009) Fracture toughness of PWR-components supports.** Knorovski, G.A.; Krieg, R.D.; Allen, G.C. Jr. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 227p. (SAND—78-2347). NTIS, PC A11/MF A01 - GPO $7.50. Order Number DE83007692.

The materials used in the component supports are classified according to three categories: 1) structural materials, 2) weld consumables, and 3) bolting materials. A further breakdown of the structural materials separates them into cast forms and wrought forms. Wrought forms will include plates, shapes (I-beams, H-beams, channels, etc.), pipes, forgings, bar, aand wire cable. The wrought materials can be further brken down into the following subcategories: plain carbon (mild) steel; carbon-manganese steel; high-strength low-alloy steel (HSLA); low alloy (non quenched and tempered) steels; and quenched and tempered steels. Material property data from numerous literature sources for these steels were assessed. As a result of the literature assessment, the following breakdown of the materials into groups is made. Where data is not available, a qualitative assessment has been made. The grouping was based mainly upon whether the average nil ductility temperature + 2σ was above 75°F (Group I), below 75°F (Group II), or well below 75°F (Group III).

23506 **Liquid level sensing device.** Tokarz, R.D. (to Dept. of Energy). US Patent 4,368,640. 18 Jan 1983. Filed date 29 Jan 1981. vp.

PAT-APPL-229424.

A liquid level sensing device comprising a load cell supporting a column or stack of segments freely resting on one another. The density of each element is substantially identical to that of the surrounding liquid. The elements are freely guided within a surrounding tube. As each element is exposed above the liquid level, its weight will be impressed through the column to the load cell, thereby providing a signal at the load cell directly proportional to the liquid level elevation.

2103 Power Reactors, Non-breeding, Graphite Moderated

REFER ALSO TO CITATION(S) 23108, 23523, 23527, 23538

23507 **(DOE/TIC—3339-Suppl.3) Gas-cooled reactor technology: a bibliography.** Raleigh, H.D. (ed.). (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). Sep 1981. 757p. NTIS, PC A99/MF A99. Order Number DE83009129.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Included are 3358 citations on gas-cooled reactor technology contained in the DOE Energy Data Base for the period January 1978 through June 1981. The citations include reports, journal articles, books, conference papers, patents, and monographs. Corporate, Personal Author, Subject, Contract Number, and Report Number Indexes are provided.

2105 Power Reactors, Breeding

REFER ALSO TO CITATION(S) 23530, 23546, 23580, 23581, 23582, 23586, 23587, 23588, 23589, 23590, 23591, 23592, 23593, 23594, 23595, 23596, 23597, 23598, 23599, 23602, 23605, 23617, 23620, 23625, 23626, 23627, 23641, 23642, 23643, 23644, 23646, 23647, 23649, 23650, 23657, 23701, 23922

23508 **(ANL/NESC—751R) SOMIX1; sodium spray fires in cylindrical cell.** Heisler, M.P.; Mori, K.K. (Atomics International Div., Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048751.

Maximum of - 5 different drop sizes For fast Fourier transform problems - (NMAX(JMAX-1)ND).LE.18000 (IMAXJMAX).LE.297 where NMAX = number of drop release time-steps, JMAX = number of radial mesh points, IMAX = number of axial mesh points, and ND = number of different drop sizes.

SOMIX1 analyzes transient free convection motion in low-oxygen gas environments of a cylindrical enclosure, representing a LMFBR heat transfer cell, following a sodium pipe rupture which releases a spray of sodium droplets. Calculated are the combustion and heat transfer from the falling spray to the gas atmosphere, droplet motion, gas temperature and pressure rise and internal gas circulation.IBM370; FORTRAN IV H Extended; OS/370; The sample problem uses 556K bytes of memory, card reader and line printer (I/O devices 5 and 6), and the SC4020 for film plotting.

23509 **(ANL/NESC—755) VARR2; CRBRP 2-dimensional transient fluid flow analysis.** Cook, J.L.; Nakayama, P.I. (Westinghouse Electric Corp., Waltz Mill, PA (USA). Advanced Reactors Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048755.

With current dimensioning, the maximum number of cells is about 1600; roughly a 40 x 40 mesh. The problem geometry must be reasonably approximated by a two-dimensional net of rectangular cells. The working fluid may be specified as sodium or water or the properties of the working fluid may be entered as part of the problem input.

VARR2 is a two-dimensional transient slightly-compressible fluid dynamics program. It solves the complete unsteady Navier-Stokes equation, the energy equation, and the continuity equation in either Cartesian or axisymmetric cylindrical geometry. Slight density variations are accounted for by use of the Boussinesq approximation, which couples the energy and momentum equations. At a cell face, the normal velocity component may be inward, outward, or zero; the tangential velocity component may specify free slip, no slip, or no slip with a turbulent velocity profile. For heat transfer problems, adiabatic or constant heat flux boundary conditions can be specified. By specifying the totality of cell-face boundary conditions in a self-consistent manner, the user can specify a wide spectrum of overall boundary conditions; for example, those called rigid, continuative, periodic, inflow/outflow, or derived.CDC7600; FORTRAN IV and COMPASS; SCOPE 2.0, SCOPE 2.1.3; 147,000 (octal) words of SCM and 14,400 (octal) words of LCM storage are used. Plotting is done using SD-4060 Stored Program Recording System.

23510 **(ANL/NESC—761R) PTA1; pipe system pressure analysis.** Youngdahl, C.K.; Kot, C.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048761.

PTA1 (Pressure Transient Analysis) performs pressure-transient analysis of large piping networks. The program is particularly oriented toward the analysis of the effects of a sodium/water reaction on the intermediate heat-transport system of a liquid-metal-cooled fast breeder reactor, but may be applied to other pulse sources and piping systems. A variety of junction types are included, and complex piping networks can be treated. The effect of elastic-plastic deformation of piping on pulse propagation, pipe friction and nonlinear velocity terms are included in the formulation.IBM370/195; FORTRAN IV; OS/370; The program requires 300K bytes of memory for execution.

23511 (ANL/NESC—762R) CACECO; LMFBR containment accident analysis. Peak, R.D. (Hanford Engineering Development Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048762.

Maxima of 25 temperature nodes in each heat structure, 24 heat structures to represent equipment, roofs, walls, and floors of the analysis cells 4 analysis cells. Reference report, HEDL-TC-859.

The CACECO program predicts the thermodynamic responses of primary and secondary containment to a variety of accidents in a Liquid Metal Fast Breeder Reactor (LMFBR) facility. The user defines these accidents in terms of the following: (a) sodium leakage as spray and spill, (b) air injection, (c) decay heat release, and (d) space cooler operation. CACECO is capable of providing pressure-temperature histories of four cells. Each cell may have connected to it any number of one-dimensional structures which can be used to model walls, floors, or equipment. The structures are linked to the cells or other structures by convective and/or radiative boundary conditions. The structures may be planar, cylindrical, or spherical and can be composed of a number of regions with different properties.CDC CYBER74;CDC7600; CDC FORTRAN Extended with only a few statements that do not comply with the American National Standards Institute (ANSI) FORTRAN.; SCOPE 3.4.4 Level 414; 120K words (octal) of memory, a tape drive, card reader and line printer are used.

23512 (ANL/NESC—768) BEHAVE-SST; overpower transient fuel mechanics. Atcheson, D.B. (General Electric Co., Sunnyvale, CA (USA). Advanced Reactor Systems Dept.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048768.

Reference report, GEFR-00001.

BEHAVE-SST calculates the steady-state and overpower transient behavior of cladding, fuel, and voidage in oxide LMFBR fuel rods prior to cladding failure. Cylindrical symmetry is assumed throughout the program. The BEHAVE-SST program calculates the stress, strain, displacement, and temperature fields in the fuel and cladding. Processes simulated include: cracking of fuel, dilation of fuel and cladding due to irradiation effects and thermal expansion, fuel densification by both stress and diffusion-controlled processes, axial slippage or locking at the fuel-cladding interface, axial flow of fuel, and gas pressurization of the central molten fuel region. Cladding failure is predicted utilizing a life-fraction cumulative damage technique.CDC7600; FORTRAN IV; SCOPE 2.1.3; 150K of small-core memory (SCM) is required. The program is overlayed extensively.

23513 (ANL/NESC—785) AXICRP; finite element code for creep analysis. Sutherland, W.H. (Computer Sciences Corp., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048785.

Maxima of 550 nodal points, 500 elements, 12 different materials, 8 different temperatures for which properties are given, 200 boundary pressure cards. The direct incremental treatment of time used restricts the program to the consideration of creep under constant load. Reference reports, BNWL-1142 and CSC-RL-SCI-112.

AXICRP is a finite-element computer code for creep analysis of plane stress, plane strain, and axisymmetric bodies of revolution. Principal application has been to obtain the creep solution for a Fast Flux Test Facility (FFTF) hexagonal flow duct. Other applications to a thick-walled cylinder and a rectangular beam demonstrate the variety of structural geometries which can be analyzed.CDC6600,7600,CYBER74; FORTRAN IV; SCOPE 3.4; Disk storage is required and use of a CalComp plotting device is optional. 142,000 (octal) words of memory are needed when the segmented load is used.

23514 (ANL/NESC—790) NUBOW-2D Inelastic; bowed reactor core analysis. Cha, B.K.; McLennan, G.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048790.

Maxima of 25 beam segments, 16 rows, 6 load points, 144 cells All the ducts are treated as thin shell hexagons, and only the radial direction effects of creep and swelling are considered. The peak fluence increment must be less than or equal to 2.5×10^{10} n/cm^2 for the purpose of determining the time increment.

This program solves the two-dimensional mechanical equilibrium configuration of a core restraint system, which is subjected to radial temperature and flux gradients, on a time increment basis. At each time increment, the code calculates the irradiation creep and swelling strains for each duct from user-specified creep and swelling correlations. Using the calculated thermal bowing, inelastic bowing and the duct dilation, the corresponding equilibrium forces, beam deflections, total beam displacements, and structural reactivity changes are calculated.IBM370; FORTRAN IV; OS/370; 250K bytes of storage are used. The program requires a card reader, a line printer, and two disk units for temporary storage of inelastic strain data. If the restart option is desired, another disk or tape unit is used for restart file data.

23515 (CNEN-RT/ING—(81)15) Thermomechanical analysis of a SPX 1 type sodium-air heat exchanger. Cesari, F.; Menghini, S.; Piolanti, G. (Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Dipartimento Reattori Veloci). Aug 1981. 182p. (In Italian). NTIS, PC A09. Order Number DE82903105.

Paper copy only, copy does not permit microfiche production.

A description is given of a mathematical model for simulating the thermohydraulics of a heat exchanger. Temperature distribution is determined for stationary and transient function. An analysis is made of the pipelines in which the sodium circulates. 9 references.

23516 (CONF-8106164—5) Calculation of thermophysical properties of sodium. Fink, J.K.; Leibowitz, L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 39p. NTIS, PC A03/MF A01. Order Number DE83008655.

From National Bureau of Standards joint conferences: 8. symposium on thermophysical properties; 17. thermal conductivity conference; 8. thermal expansion conference; Gaithersburg, MD, USA (15 Jun 1981).

The thermodynamic properties of sodium previously recommended by Padilla have been updated. As much as possible, the approach described by Padilla has been used. For sodium in the states of saturated liquid and vapor, subcooled liquid and superheated vapor, the following thermodynamic properties were determined: enthalpy, heat capacity (constant pressure and constant volume), pressure, density, thermal-expansion coefficient, and compressibility (adiabatic and isothermal). In addition to the above properties, thermodynamic properties including heat of fusion, heat of vaporization, surface tension, speed of sound and transport properties of themal conductivity, thermal diffusivity, emissivity, and viscosity were determined for saturated sodium.

23517 (DOE/NE/34087—T1-Vol.2, pp 5.69-5.82) Design, fabrication, and performance of high burn-up sphere-pac fuel rods. Stratton, R.W. (Swiss Federal Institute for Reactor Research (EIR), Wuerenlingen). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The special characteristics of sphere-pac fuel design and fabrication are presented. Results from EIR's irradiation and development programme on sphere-pac carbide (fast reactor) fuels are given which may be relevant to oxide sphere-pac behavior for LWR's. Burn-ups of 6 to 7% fima (60 to 70 MWd/kg) were reached without major problem and with further burn-up margin

available. Detailed differences to pellet fuels behavior are noted and the influence these may have on the modelling of sphere-pac fuel performance.

23518 (DOE/SF/70010—T34) Foster Wheeler protected bayonet-tube steam-generator conceptual designs. Bosch, R. (Foster Wheeler Corp., Livingston, NJ (USA). Nuclear Dept.). 26 Apr 1974. Contract AT03-76SF70010. 49p. NTIS, PC A03. Order Number DE82007983.

Paper copy only, copy does not permit microfiche production.

The Foster Wheeler steam generators are bayonet tube type heat exchangers which utilize a protector tube arrangement designed to mitigate the effects of a sodium/water reaction.

23519 (HEDL-TME—73-51) Effect of high solvent radiation exposures on TBP processing of spent LMFBR fuels. Richardson, G.L. (Hanford Engineering Development Lab., Richland, WA (USA)). Jun 1973. Contract AC06-76FF02170. 134p. NTIS, PC A07/MF A01. Order Number DE83009821.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The results of laboratory experiments with miniature, multistage contactors showed that tri-n-butyl phosphate (TBP) can be used satisfactorily to process high burnup, short-cooled LMFBR fuels at solvent radiation exposures up to and including 0.5 W/h/l per pass, the probable maximum exposure for pulse column processing of LMFBR fuel. No further adverse effects were found for cumulative cyclic exposure of over 45 W-h/l. The major adverse effects of high solvent radiation exposures (ca. 2 W-h/l) were an approximately 10 to 30-fold decrease in the ^{95}Zr and ^{95}Nb decontamination factors to the uranium and plutonium aqueous product streams and an approximately 200 to 500-fold increase in the uranium loss to the stripped solvent (0.02 to 0.04% of the uranium in the solvent entering the contactor). Flowsheet conditions were developed for restoring the fission product decontamination performance at high radiation doses.

23520 Sealing arrangement with annular flexible disc. Honigsberg, C.A.; Pennell, W.E. (to Dept. of Energy). US Patent 4,369,893. 25 Jan 1983. Filed date 19 Feb 1981. vp.

PAT-APPL-235371.

Fluid sealing arrangements including an annular shaped flexible disc having enlarged edges disposed within channel-shaped annular receptacles which are spaced from one another. The receptacles form an annular region for contacting and containing the enlarged edges of the disc, and the disc is preloaded to a conical configuration. The disc is flexibly and movably supported within the receptacles so that unevenly distributed relative motion between the components containing the receptacles is accommodated without loss of sealing contact between the edges of the disc and the walls of the receptacles.

23521 Emergency core cooling system. Glasgow, L.E.; Schenewerk, W.E. (to Dept. of Energy). US Patent 4,367,194. 4 Jan 1983. Filed date 22 Sep 1980. vp.

PAT-APPL-189534.

A liquid metal cooled fast breeder reactor provided with an emergency core cooling system includes a reactor vessel which contains a reactor core comprising an array of fuel assemblies and a plurality of blanket assemblies. The reactor core is immersed in a pool of liquid metal coolant. The reactor also includes a primary coolant system comprising a pump and conduits for circulating liquid metal coolant to the reactor core and through the fuel and blanket assemblies of the core. A converging -diverging venturi nozzle with an intermediate throat section is provided in between the assemblies and the pump. The intermediate throat section of the nozzle is provided with at least one opening which is in fluid communication with the pool of liquid sodium. In normal operation, coolant flows from the pump through the nozzle to the assemblies with very little fluid flowing through the opening in the throat. However, when the pump is not running, residual heat in the core causes fluid from the pool to flow through the opening in the throat of the nozzle and outwardly through the nozzle to the assemblies, thus providing a means of removing decay heat.

2107 Regulation And Licensing

REFER ALSO TO CITATION(S) 23621, 23622, 23623, 23625, 23626

23522 (DOE/NE/34087—T1-Vol.2, pp 6.31-6.37) Regulatory perspective on extended burnup fuel. Rubenstein, L.S.; Tokar, M. (Nuclear Regulatory Commission, Washington, DC). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

A regulatory perspective on extending LWR fuel burnups beyond the current 28 to 33 GWd/t batch average level is presented. The incentives for higher burnups are discussed. The relationships of licensing considerations to requirements expressed in the Code of Federal Regulations and Standard Review Plan are addressed. Actions taken by NRC's Office of Nuclear Reactor Regulation to acquire further information and to communicate with industry regarding extended burnup projections, test and demonstration program results and plans, and current technical assessments of burnup-related phenomena are reviewed. It is concluded that there is no need to generate new regulations for extended burnup, and that there is probably sufficient data to support the finding that extended burnup operation is safe and licensable, but there is some concern over the sparsity of transient performance data for fuel at higher-than-traditional burnups.

23523 (NUREG—0020-Vol.6-No.11) Licensed operating reactors. Status summary report data as of October 31, 1982. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Nov 1982. 394p. NTIS, PC A17/MF A01 - GPO. Order Number DE83901552.

The US Nuclear Regulatory Commission's monthly LICENSED OPERATING REACTORS Status Summary Report provides data on the operation of nuclear units as timely and accurately as possible. This report is divided into three sections: the first contains monthly highlights and statistics for commercial operating units, and errata from previously reported data; the second is a compilation of detailed information on each unit, provided by NRC Regional Offices, IE Headquarters and the Utilities; and the third section is an appendix for miscellaneous information such as spent fuel storage capability, reactor years of experience and non-power reactors in the United States.

23524 (NUREG—0304-Vol.7-No.4) Regulatory and technical reports. (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control). Feb 1983. 531p. NTIS, PC A23/MF A01 - GPO. Order Number DE83901399.

The report listings in this compilation are arranged by report number, where NUREG-XXXX is an NRC staff originated report, NUREG/CP-XXXX is an NRC sponsored conference report, and NUREG/CR-XXXX is an NRC contractor-prepared report. The bibliographic information is followed by a brief abstract of the report.

23525 (NUREG—0540-Vol.4-No.12) Title list of documents made publicly available, December 1-31, 1982. (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control). 1982. 536p. NTIS, PC A23/MF A01 - GPO. Order Number DE83901816.

Portions are illegible in microfiche products.

The Title List of Documents Made Publicly Available is a monthly publication. It contains descriptions of the information received and generated by the US Nuclear Regulatory Commission (NRC). This information includes (1) docketed material associated with civilian nuclear power plants and other uses of radioactive materials and (2) nondocketed material received and generated by NRC pertinent to its role as a regulatory agency. As used here, docketed does not refer to Court dockets; it refers to the system by which NRC maintains its regulatory records. This series of documents is indexed by a Personal Author Index, a Corporate Source Index, and a Report Number Index. The docketed information con-

tained in the Title List includes the information formerly issued through the Department of Energy publication Power Reactor Docket Information, last published in January 1979.

23526 **(NUREG—0580-Vol.12-No.2) Regulatory licensing status summary report. Nuclear power plants data for decisions (blue book), February 1-February 28, 1983.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Mar 1983. 79p. NTIS, PC A05/MF A01 - GPO. Order Number DE83901511.

This management report, Regulatory licensing status summary report, is designed to provide the necessary information for controlling the progress of review processes for central station nuclear reactor applications. Section I of this edition consists of the three summary of accomplishments, the new application forecast for OL's and CP's, and an abbreviation key. Section II represents the main body of the report and consists of the facility information. All OL's are listed first, followed by CP's, standard design reviews, other reviews, and finally, a non-power reactor summary. Each project consists of general facility data, current status for all phases of the review, and targeted and actual completion dates for all key milestones in the review.

23527 **(NUREG—0748-Vol.3-No.2) Operating reactors licensing actions summary.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Mar 1983. 299p. NTIS, PC A13/MF A01 - GPO. Order Number DE83901883.

Portions are illegible in microfiche products.

The operating reactors licensing actions summary is designed to provide the management of the Nuclear Regulatory Commission (NRC) with an overview of licensing actions dealing with operating power and nonpower reactors. These reports utilize data collected from the Division of Licensing in the Office of Nuclear Reactor Regulation and are prepared by the Office of Management and Program Analysis. This summary report is published primarily for internal NRC use in managing the operating reactors licensing actions program. Its content will change based on NRC management informational requirements.

23528 **(NUREG—0857-Suppl.4) Safety evaluation report related to the operation of Palo Verde Nuclear Generating Station, Units, 1, 2, and 3: Docket Nos. STN 50-528, STN 50-529, and STN 50-530.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Mar 1983. 37p. NTIS, PC A03/MF A01 - GPO $4.50. Order Number DE83901527.

Information is presented concerning site characteristics; mechanical systems and components; reactor coolant system; engineered safety systems; reactor instrumentation; reactor operations; and quality assurance.

23529 **(NUREG—0964) Technical specifications: McGuire Nuclear Station, Unit Nos. 1 and 2. Docket Nos. 50-369 and 50-370.** Anderson, F. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Mar 1983. 593p. NTIS, PC A25/MF A01 - GPO $12.00. Order Number DE83901401.

Portions are illegible in microfiche products.

Information is presented concerning safety limits for operation; control systems; power distribution limits; instrumentation; primary coolant circuit; emergency core cooling systems; containment systems; steam turbines and secondary coolant circuits; electrical equipment; refueling operations; radioactive effluents; and reactor site.

23530 **(NUREG/CR—3116) Evaluation of nuclear-facility decommissioning projects, Enrico Fermi-1 reactor.** Miller, R.L.; Link, B.W. (UNC Nuclear Industries, Inc., Richland, WA (USA). Office of Surplus Facilities Management). Feb 1983. 40p. NTIS, PC A03/MF A01 - GPO $4.75. Order Number DE83901891.

Portions are illegible in microfiche products.

This report summarizes information concerning the decommissioning of the Enrico Fermi-1 reactor. Decommissioning data from available documents and other decommissioning records were input into a computerized data-handling system in a manner that permits specific information to be readily retrieved. The information is presented both in detail in its computer-output form, and as a manually assembled summarization, generated for the purpose of highlighting the more-important aspects of the decommissioning program.

23531 **(UCID—19701) Technical issues related to NUREG 0800, Chapter 18: Human Factors Engineering/ Standard Review Plan.** Savage, J.W. (Lawrence Livermore National Lab., CA (USA)). 5 Nov 1982. Contract W-7405-ENG-48. 18p. NTIS, PC A02/MF A01. Order Number DE83009111.

The revision of Chapter 18 of NUREG 0800, Human Factors Engineering Standard Review Plan (SRP) will be based on SECY 82-111 and guidance contained in NUREG 0700, NUREG 0801 and NUREG 0835, plus other references. In conducting field reviews of control rooms, the NRC has identified technical issues which can be used to enhance the development of the revised version of NUREG 0800, and to establish priorities among the list of possible Branch Technical Positions (BTP) in NUREG 0800, Rev. 0, Table 18.0-2. This report is a compilation of comments and suggestions from the people who used NUREG 0700 in the Control Room field reviews. This information was used to establish possible BTP topic priorities so that the most important BTPs could be issued first. The comments and suggestions are included for HFEB review in conjunction with the table of priorities.

2108 Economics

REFER ALSO TO CITATION(S) 23419, 23422, 23478, 23491, 23701, 23741

23532 (DOE/NE/34087—T1-Vol.2, pp 7.19-7.23) **Economics of extended burnup from a utility point of view.** Hoffmann, H. (Rheinisch-Westfaelisches Elektrizitaetswerk AG, Essen, Germany); Wolff, U.; Bauer, F. 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

A series of changes in the nuclear fuel cycle parameters and the power utility constraints have initiated a reoptimization of the burnup goal. These facts have been analyzed and discussed taking into account the particular situation in Germany. The main conclusions are: there is a strong incentive on increase essentially the discharge burnup to 50 GWd/tHM in connection with the increase of the enrichment; and the optimal cycle length depends strongly on costs of outage time and maintenance in fact with tendency to longer cycles. Optimization flexibility, however, is limited by constraints due to, e.g., licensing guidelines, storage capacity for spent fuel, and grid requirements.

23533 (DOE/NE/34087—T1-Vol.2, pp 7.61-7.69) **Projected national and world benefits to the LWR fuel cycle from extended burnup.** Murphie, W.E.; Lang, P.M. (Dept. of Energy, Washington, DC). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

The benefits of extended burnup to the light water reactor fuel cycle were quantified using projected schedules for US and foreign implementation of extended burnup. Savings in spent fuel generation, uranium and separative work requirements, and fuel cycle costs on an annual and cumulative basis are presented for both the United States and the world. Projected US savings resulting from relaxed plant power maneuvering restrictions due to the use of pellet-cladding interaction resistant fuel and from lengthened operating cycles facilitated by extended burnup are quantified, based on projected implementation schedules.

23534 (DOE/NE/34087—T1-Vol.2, pp 7.71-7.90) **Impact of extended burnup on the BWR fuel cycle.** Brown, P.D. (Tennessee Valley Authority, Chattanooga); Ratliff, J.R.; Taylor, O.W.; Crowther, R.L.; Hopkins, G.C.; Kunz, C.L.; Savoi, P.J.; Townsend, D.B.; Wei, P.; Yee, D. 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

BWR improvement alternatives which extend fuel burnup have been under evaluation as part of a DOE/TVA/GE program. Alternatives which extend burnup with no increase in fuel enrichment were considered to minimize separative work (SWU) requirements and to mitigate potentially adverse impacts of increased enrichments on power distributions, control characteristics, and licensing. Primary focus was on evaluations of alternatives which appeared to be practical for reasonably near term application to a specific TVA operating reactor, Browns Ferry Unit 3. The evaluations included considerations of impacts on thermal margins, fuel reliability, capacity factor, operating flexibility, license limits, fuel cycle resource requirements and fuel cycle economics. The International Nuclear Fuel Cycle Evaluation (INFCE) conclusions that the BWR has high potential for fuel cycle improvement were confirmed by the evaluations, and it was concluded that many of the most promising improvements are retrofitable to existing operating reactors. This paper is an overview of the evaluations with particular emphasis on fuel cycle resource requirements and economics.

23535 (DOE/NE/34087—T1-Vol.2, pp 7.91-7.107) **Extending BWR burnup with spectral shift control.** Churlik, D.G.; Crowther, R.L.; Hopkins, G.C.; Savoia, P.J.; Wei, P.; Yee, D. (General Electric Co., San Jose, CA). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

BWR spectral shift control increases burnup with no enrichment increase and saves uranium, SWUs and fuel assemblies, while also reducing disposal or reprocessing costs. BWR Spectral Shift has been evaluated under two separate programs: The DOE/TVA/GE Improved Uranium Utilization Program and the ESEERCO/Niagara Mohawk/GE Spectral Shift Program. Spectral Shift by means of flow control and axial power shaping (burnup shape optimization) were evaluated. The evaluations included considerations of impact on thermal and reactivity margins, operating flexibility, fuel cycle resource requirements, fuel cycle economics and special requirements for implementation.

23536 (DOE/RG/10268—T3) **Funding nuclear-power-plant decommissioning. Final report.** Burns, R.E.; Henderson, J.S.; Pollard, W.; Pryor, T.; Chen, Y.M. (National Regulatory Research Inst., Columbus, OH (USA)). Oct 1982. Contract FG01-80RG10268. 135p. NTIS, PC A07/MF A01. Order Number DE83008950.

Decommissioning of a nuclear power plant is the removal of contaiminant radioactive material down to residual levels considered acceptable for permitting unrestricted use of the plant and its site. While the regulation of activities related to decommissioning of nuclear power plants has traditionally been within the purview of the Nuclear Regulatory Commission (NRC), the actual collection of decommissioning funds by a regulated utility is accomplished through a financial arrangement subject to approval by a utility regulatory commission. Several nuclear power plants are now approaching the end of their useful lives. Concurrently the NRC is reassessing its regulations and guidelines on acceptable decommissioning options. The NRC is also reassessing its regulations concerning the assurance of funding for decommissioning. The NRC plans to issue proposed rule changes concerning decommissioning in February 1983. Then, funding for decommissioning must be addressed by the state public utility commissions.

23537 **Review of qualification for nuclear power plant operators.** Clausen, M.J.; Persenky, J.J.; Shikiar, R. (Battelle-Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352). *Transactions of the American Nuclear Society;* **41**: 181(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

2109 Process Heat Reactors

23538 **(GA-A—16356) HTGR applications program. Semiannual report for the period October 1, 1980-March 31, 1981.** (General Atomic Co., San Diego, CA (USA)). May 1982. Contract AT03-76SF70046. 402p. NTIS, PC A18/MF A01. Order Number DE83009074.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report summarizes the current progress of GA commercial HTGR application studies, with emphasis on three basic HTGR heat sources with 750°C (1382°F), 850°C (1562°F), and 950°C (1742°F) core outlet temperatures. These outlet temperatures then define the supporting technical systems and the potential process applications. Nuclear heat source designs for 1170-MW(t) and 2240-MW(t) HTGR-SC/C plants are described together with plant seismic model and component dynamic analyses, risk assessment, and the results of plant optimization studies. An initial survey of the potential of the HTGR-SETS, a concept that couples a conventional HTGR NHS to an external heat transport and sensible heat storage system, is discussed. Candidate applications are identified. Two process heat variants, an 850°C (1562°F) (indirect cycle) and a 950°C (1742°F) (direct cycle) 1170-MW(t) HTGR-PH plant, are defined. System design, plant dynamics and control, safety, and reliability evaluation of the two concepts are considered. The results of a review of process heat requirements to determine the suitability of the HTGR-PH for supplying high-temperature heat energy for hydrogen production, coal liquefaction, and other processes are presented.

22 NUCLEAR REACTOR TECHNOLOGY

2201 Theory And Calculation

REFER ALSO TO CITATION(S) 23642, 23643, 23644, 23646, 23647, 23648, 23650, 23654, 23655, 23656, 24724

23539 **(ANL/NESC—784) DSNP; dynamic simulation nuclear power plants.** Saphier, D. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048784.

DSNP (Dynamic Simulator for Nuclear Power-Plants) is a system of programs and data files by which a nuclear power plant, or part thereof, can be simulated. The acronym DSNP is used interchangeably for the DSNP language, the DSNP libraries, the DSNP precompiler, and the DSNP document generator. The DSNP language is a special-purpose, block-oriented digital-simulation language developed to facilitate the preparation of dynamic simulations of a large variety of nuclear power plants. It is a user-oriented language that permits the user to prepare simulation programs directly from power plant block diagrams and flow charts by recognizing the symbolic DSNP statements for the appropriate physical components and listing these statements in a logical sequence according to the flow of physical properties in the simulated power plant. Physical components of nuclear power plants are represented by functional blocks, or modules. The nuclear reactor, for example, has a kinetic module, a power distribution module, a feedback module, a thermodynamic module, a hydraulic module, and a radioactive heat decay module. Basic functional blocks such as integrators, pipes, function generators, connectors, and many auxiliary functions representing properties of materials used in nuclear power plants are also available. The DSNP precompiler analyzes the DSNP simulation program, performs the appropriate translations, inserts the requested modules from the library, links

these modules together, searches necessary data files, and produces a simulation program in FORTRAN. IBM370; FORTRAN IV and DSNP; OS/370; 240K bytes of storage are required to compile and translate a typical power plant simulation program. Six scratch files require disk or fast magnetic tape storage and a permanent library file unit is used. All sample problems were executed in a 250K byte or smaller region.

23540 **(ANL/NESC—961) PREMOR; two-group point reactor power plant model.** Vondy, D.R. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048961.

Maxima of - 13 actinides 11 fission products 1 lumped absorber 20 resident feed batches.

PREMOR is a two-group point nuclear reactor power plant model for survey analysis. Critical core requirements and desired power level are satisfied by a direct iteration procedure which adjusts the actinide feed composition as needed. Either continuous or batch fueling may be modeled. Iteration may be accomplished to achieve an optimum fuel cost, or a series of succeeding problems solved to vary the neutron loss fraction. Results obtained include the neutron absorption distribution, nuclide concentrations, fuel cost and ore requirements, and integral information such as the fuel conversion ratio and doubling time, fuel consumption rate, effective neutron production per absorption and reactivity importance of the nuclides at selected points in the reactor history. The program has been used extensively for analysis of the graphite-moderated, gas-cooled reactor concept.IBM360,370,303x; FORTRAN IV (97%) and Assembler (3%); OS/360; 164K bytes of memory are required for execution..

23541 **(CONF-810507—2) Tube crossflow force measurements.** Mulcahy, T.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83008626.

From Society for Experimental Stress Analysis meeting; Dearborn, MI, USA (31 May 1981).

Portions are illegible in microfiche products.

A transducer has been designed and verified which has the potential for measuring lift and drag forces on circular rods in turbulent cross flow. The transducer is currently being used to obtain data.

23542 **(CONF-820601—27) Simulation of thermal-transient-induced-pipe-flow stratification using COMMIX-2.** Shah, V.L.; Domanus, H.M.; Miao, C.C.; Schmitt, R.C.; Sha, W.T. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83008746.

From ASME pressure vessel and piping conference; Orlando, FL, USA (27 Jun 1982).

Portions are illegible in microfiche products.

At low-flow (high Richardson number) in a piping system with thermal transient, thermal-buoyancy-induced secondary flows exist. Three-dimensional computer codes are, therefore, necessary to model correctly the non-axisymmetric, thermally stratified flow through a piping system. This paper presents the results of the numerical simulation of thermal-hydraulic behavior in a pipe during a thermal transient. The particular transient considered was the experimental test No. PIPE2, and carried out at the Mixing Components Test Facility (MCTF). The numerical simulation was performed using COMMIX-2. COMMIX-2 is a computer code for steady/unsteady, three-dimensional, two-phase thermal-hydraulic analysis of reactor components under normal and off-normal operating conditions. The results of simulation are compared with the experimental measurements and they are in reasonable agreement with experimental data.

23543 **(NUREG/CR—0200-Vol.2) BONAMI-S: resonance self-shielding by the Bondarenko method. Volume 2. Functional studies.** Greene, N.M. (Oak Ridge National Lab., TN (USA)). Oct 1981. Contract W-7405-ENG-26. 197p. (ORNL/NUREG/CSD—2-V2). NTIS, PC A09/MF A01. Order Number DE82016031.

BONAMI-S is a module of the SCALE (standardized computer analyses for licensing evaluation) system which is used to perform Bondarenko calculations for resonance self-shielding. Cross sections and Bondarenko factor data are input from an AMPX master library. The output is written as an AMPX master library. A wide variety of options is provided for different lattices and cell geometries through the use of Dancoff approximations. A novel interpolational scheme is used which avoids many of the problems of the widely employed Lagrangian schemes.

23544 **(UCRL—53369-Vol.1) Nuclear criticality safety experiments, calculations, and analyses: 1958 to 1982. Volume 1. Lookup tables.** Koponen, B.L.; Hampel, V.E. (Lawrence Livermore National Lab., CA (USA)). 21 Oct 1982. Contract W-7405-ENG-48. 207p. NTIS MF A01. Order Number DE83009100.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted.

This compilation contains 688 complete summaries of papers on nuclear criticality safety as presented at meetings of the American Nuclear Society (ANS). The selected papers contain criticality parameters for fissile materials derived from experiments and calculations, as well as criticality safety analyses for fissile material processing, transport, and storage. The compilation was developed as a component of the Nuclear Criticality Information System (NCIS) now under development at the Lawrence Livermore National Laboratory. The compilation is presented in two volumes: Volume 1 contains a directory to the ANS Transaction volume and page number where each summary was originally published, the author concordance, and the subject concordance derived from the keyphrases in titles. Volume 2 contains - in chronological order - the full-text summaries, reproduced here by permission of the American Nuclear Society from their Transactions, volumes 1-41.

23545 **(UCRL—53369-Vol.2) Nuclear criticality safety experiments, calculations, and analyses - 1958 to 1982. Volume 2. Summaries. Compilation of papers from the Transactions of the American Nuclear Society.** Koponen, B.L.; Hampel, V.E. (Lawrence Livermore National Lab., CA (USA)). 21 Oct 1982. Contract W-7405-ENG-48. 824p. NTIS MF A01. Order Number DE83009210.

Microfiche only, copy does not permit paper copy reproduction.

This compilation contains 688 complete summaries of papers on nuclear criticality safety as presented at meetings of the American Nuclear Society (ANS). The selected papers contain criticality parameters for fissile materials derived from experiments and calculations, as well as criticality safety analyses for fissile material processing, transport, and storage. The compilation was developed as a component of the Nuclear Criticality Information System (NCIS) now under development at the Lawrence Livermore National Laboratory. The compilation is presented in two volumes: Volume 1 contains a directory to the ANS Transaction volume and page number where each summary was originally published, the author concordance, and the subject concordance derived from the keyphrases in titles. Volume 2 contains-in chronological order-the full-text summaries, reproduced here by permission of the American Nuclear Society from their Transactions, volumes 1-41.

23546 **Fuel - cladding gap conductance measurements using Kalman filter methods.** Meek, C.C.; Doerner, R.C. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 360-361(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23547 **In-pile measurement of the total vapor pressure over high-purity UO_2.** Reil, K.O.; Breitung, W. (Sandia National Laboratories, Albuquerque, NM 87185). *Transactions of the American Nuclear Society;* **41**: 361-362(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23548 **Incorporation of clad effects into Sauer's method for computing Dancoff factors.** Williams, M.L.; Gilai, D. (Oak Ridge National Lab., TN (USA)). *Annals of Nuclear Energy;* **9**: No. 3, 137-140(1982).

A simple method is presented to modify Sauer's approximation for the lattice Dancoff factor to account for clad interactions. It is shown that for some tight-pitch lattices the difference in Dancoff factors with and without clad present may cause up to 0.5% difference in ksub(eff). The present technique has the advantages of: (a) being easy to implement into existing codes; (b) having negligible impact on execution time; and (c) showing good agreement with sophisticated methods.

2202 Components And Accessories

REFER ALSO TO CITATION(S) 23919, 23921, 23922

23549 **(NUREG/CR—2716-Vol.3) Reactor-safety research programs. Quarterly report, July-September 1982.** Edler, S.K. (ed.). (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 79p. (PNL—4275-3). NTIS, PC A05/MF A01 - GPO $5.00. Order Number DE83009327.

Portions are illegible in microfiche products.

Evaluations of nondestructive examination (NDE) techniques and instrumentation are reported; areas of investigation include demonstrating the feasibility of determining the strength of structural graphite, evaluating the feasibility of detecting and analyzing flaw growth in reactor pressure boundary systems, examining NDE reliability and probabilistic fracture mechanics, and assessing the integrity of pressurized water reactor steam generator tubes where service-induced degradation has been indicated. Experimental data and analytical models are being provided to aid in decision-making regarding pipe-to-pipe impacts following postulated breaks in high-energy fluid system piping. Core thermal models are being developed to provide better digital codes to compute the behavior of full-scale reactor systems under postulated accident conditions.

23550 **(NUREG/CR—3063) Summary of the Plant Electrical Systems (PES) Study.** Wyant, F.J.; Cropp, L.O.; Aronson, E.A.; Maxwell, R.L. (Sandia National Labs., Albuquerque, NM (USA)). Dec 1982. Contract AC04-76DP00789. 86p. (SAND—82-2730). NTIS, PC A05/MF A01 - GPO. Order Number DE83008994.

Portions are illegible in microfiche products.

This report summarizes Sandia National Laboratories' efforts in assessing nuclear power plant electrical system performance. Initial scoping study results, including an Licensee Event Report (LER) search and a survey of Plant Electrical Systems (PES) analysis techniques, are discussed. Descriptions of the limits of the proposed analysis and tasks, broken down by activities, are given. A number of large network codes were evaluated, and a summary of the characteristics and suitability of each code is presented. Results of test runs made on two of the codes (EMTP and SCEPTRE) are discussed. Recommendations for additional study of nuclear power plant electrical systems are presented.

23551 **(NUREG/CR—3135) Buckling investigation of ring-stiffened cylindrical shells with reinforced openings under unsymmetrical axial loads.** Baker, W.; Bennett, J. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 49p. (LA—9646-MS). NTIS, PC A03/MF A01. Order Number DE83008685.

Four steel shells having features representative of steel containment vessels for nuclear power plants were fabricated and tested to failure under unsymmetrical axial loading. All of the ring-stiffened shells were 698 mm (27.5 in.) in diam by 0.762 mm (0.030 in.) in wall thickness. Each one had a penetration that was reinforced in accordance with the area-replacement rule of the applicable American Society of Mechanical Engineers (ASME) code and of a design to simulate actual practice for steel containments. The penetrations were of four different diameters, cutting no ring stiffeners, and cutting one-, two-, and three-ring stiffeners. Before testing, imperfections were measured, and strain gages were applied to characterize the strain field at an end and around the penetration. Buckling loads were determined.

23552 **Removable, hermetically-sealing, filter attachment system for hostile environments.** Mayfield, G.L. (to Dept. of Energy). US Patent 4,372,853. 8 Feb 1983. Filed date 3 Jun 1981. vp.

PAT-APPL-269459.

A removable and reusable filter attachment system. A filter medium is fixed to, and surrounded by, a filter frame having a coaxial, longitudinally extending, annular rim. The rim engages an annular groove which surrounds the opening of a filter housing. The annular groove contains a fusible material and a heating mechanism for melting the fusible material. Upon resolidifying, the fusible material forms a hermetic bond with the rim and groove. Remelting allows detachment and replacement of the filter frame.

23553 **(ORNL-tr—4968) Diffusion of hydrogen in yttrium.** Vorobyov, V.V.; Ryabchikov, L.N. Translated from *Ukrainskii Fizicheskii Zhurnal (Russian Edition)* ; **11**: No. 2, 209-211(1966). Contract W-7405-ENG-26. 7p. NTIS, PC A01/MF A01. Order Number DE83008579.

Portions are illegible in microfiche products.

In this work the diffusion coefficients of hydrogen in yttrium were determined from the rate at which the hydrogen was released from yttrium samples under a vacuum at temperatures of 450 to 850°C and from the quantity of hydrogen retained by yttrium at hydrogen pressures below 5×10^{-4} mm Hg in the same temperature range.

2203 Fuel Elements

REFER ALSO TO CITATION(S) 23446, 23547, 23643, 23648, 23651

23554 **(ANL/NESC—770) GAPCON-THERMAL3; fuel steady state & transient behavior.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Stewart, K.B. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048770.

Modeling is axisymmetric for the thermal and mechanical calculations. The current model does not compute the strain at pellet-pellet interfaces. As many as 17 variable-length axial regions can be modeled with no limitation on the number of fuel and cladding radial nodes. Reference report, PNL-2434.520P.

GAPCON-THERMAL3 calculates the thermal and mechanical behavior of the fuel and cladding in a nuclear fuel rod during normal operation for both steady-state and operational transients.CDC6600,7600,CYBER74; CDC Extended FORTRAN IV; SCOPE 3.4 (CDC6600), NOS/BE and SCOPE 2.1 (CDC7600); About 220K of addressable storage is needed for execution of a typical problem.

23555 **(ANL/NESC—817) COVE1; creep collapse for oval fuel pin tube.** Mohr, C.L. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048817.

COVE1 does not include the thermal gradient in either the stress or creep calculation. A uniform temperature through the thickness of the tube is assumed, and creep strains and thermal stress effects due to the thermal gradients are not included. Reference report, BNWL-1896.

COVE1 is a time-dependent incremental creep collapse code that estimates the change in ovality of a fuel pin cladding tube. Application is intended primarily for tubes manufactured from zircaloy. Therefore, provision is made for the effects of anisotropy in the Prandtl-Reuss flow equations for inelastic incremental deformations by using the P and R strain ratio coefficients. The creep deformation is computed in terms of the length of the collapse zone

and includes the effects of changes in temperatures, system pressure, fill gas pressure, and neutron flux levels.CDC6600; FORTRAN IV; SCOPE 3.4.2; 135K (octal) storage is required for execution.

2204 Control Systems

REFER ALSO TO CITATION(S) 23531, 23639

23556 **(NUREG/CR—3114) Workshop on cognitive modeling of nuclear-plant control-room operators.** Abbott, L.S. (ed.). (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 208p. (ORNL/TM—8614; CONF-8208111—). NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

This document presents 11 invited papers and the deliberations of four working groups at a Workshop on Cognitive Modeling of Nuclear Plant Control Room Operators that was held in Dedham, Massachusetts, under the sponsorship of the US Nuclear Regulatory Commission. The purpose of the workshop was to review the status of cognitive modeling and to recommend to the NRC whether it should support research directed toward the development of a cognitive model of a reactor operator that could be useful by itself or as a part of a larger model of the human-machine system. It was the consensus of the invited papers and the working groups that some cognitive models developed for other types of systems can be adapted to the reactor operator under limited and precisely defined conditions (and, indeed, some already are being used).

23557 (NUREG/CR—3114, pp 13-35) **Role of cognitive models of operators in the design, operation and licensing of nuclear power plants.** Rasmussen, J. (Risoe National Lab., Roskilde, Denmark). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

Cognitive models of the behavior of nuclear power plant operators - that is, models developed in terms of human properties rather than external task characteristics - are assuming increasingly important roles in plant design, operation and licensing. This is partly due to an increased concern for human decision making during unfamiliar plant conditions, and partly due to problems that arise when modern information technology is used to support operators in complex situations. Some of the problems identified during work on interface design and risk analysis are described. First, the question of categories of models is raised. Next, the use of cognitive models for system design is discussed. The use of the available cognitive models for more effective operator training is also advocated. The need for using cognitive models in risk analysis is also emphasized. Finally, the sources of human performance data, that is, event reports, incident analysis, experiments, and training simulators are mentioned, and the need for a consistent framework for data analysis based on cognitive models is discussed.

23558 (NUREG/CR—3114, pp 36-51) **Framework for modeling supervisory control behavior of operators of nuclear power plants.** Baron, S.; Feehrer, C.; Muralidharan, R.; Pew, R.; Horwitz, P. (Bolt, Beranek and Newman, Inc., Cambridge, MA). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

The importance of modeling the human-machine system has long been recognized, and many attempts have been made to estimate the operator's effect on system performance and reliability. The development of reliability models has been aimed at providing the means for exploring the physical consequences of specific classes of human error. However, the total impact of human performance on system operation and the adequacy of existing design and operating standards cannot be adequatly captured or assessed by simple error probabilities, or even by the combination of such probabilities. The behaviors of relevance are supervisory in nature, with a substantial cognitive component. The broad requirements for a model of human supervisory control are extensive and suggest that a highly sophisticated computer model will be needed. The purpose of this paper is to provide a brief overview of the approach employed in developing such supervisory control models; of some proposed specializations and extensions to adapt them for the nuclear power plant case; and of the potential utility of such a model.

23559 (NUREG/CR—3114, pp 52-62) **Cognitive models and computer aids for nuclear plant control room operators.** Sheridan, T.B. (Massachusetts Inst. of Technology, Cambridge). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

This paper reviews what is usually meant by a cognitive model of a control room operator in a nuclear power plant. It emphasizes the idea of internal (that is, mental) representation of external events and the use of such representation for the cognitive steps of attending, recognizing or learning, assessing and deciding. As computers play an increasingly important role in nuclear power plants, especially as cognitive aids to human supervisors of highly automated control systems, it is important that the software and computer interface characteristics be compatible with the operator's internal model. Specific examples discussed in this paper are in the monitoring and prediction of the plant state and in the detection and diagnosis of failures. Current trends in SPDS (safety parameter display system) and failure detection/location systems will be discussed in this regard.

23560 (NUREG/CR—3114, pp 63-72) **Visual momentum: an example of cognitive models applied to interface design.** Woods, D.D. (Westinghouse Research and Development Center, Pittsburgh, PA). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

The growth of computer applications has radically changed the nature of the man-machine interface. Through increased automation, the nature of the human's task has shifted from an emphasis on perceptual-motor skills to an emphasis on cognitive activities (e.g., problem solving and decision making). The result is a need to improve the cognitive coupling of person and machine. The goal of this paper is to describe how knowledge from cognitive psychology can be used to provide guidance to display system designers and to solve human performance problems in person-machine systems. The mechanism is to explore one example of a principle of man-machine interaction - visual momentum - that was developed on the basis of a general model of human front-end cognitive processing.

23561 (NUREG/CR—3114, pp 73-91) **Using cognitive modeling to improve the man-machine interface.** Newton, R.A. (Wisconsin Electric Power Co., Milwaukee); Zyduck, R.C.; Johnson, D.R. 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

A group of utilities from the Westinghouse Owners Group was formed in early 1980 to examine the interface requirements and to determine how they could be implemented. The products available from the major vendors were examined early in 1980 and judged not to be completely applicable. The utility group then decided to develop its own specifications for a Safety Assessment System (SAS) and, later in 1980, contracted with a company to develop the system, prepare the software and demonstrate the system on a simulator. The resulting SAS is a state-of-the-art system targeted for implementation on pressurized water reactor nuclear units. It has been designed to provide control room operators with centralized and easily understandable information from a computer-based data and display system. This paper gives an overview of the SAS

plus a detailed description of one of its functional areas - called AIDS. The AIDS portion of SAS is an advanced concept which uses cognitive modeling of the operator as the basis for its design.

23562 (NUREG/CR—3114, pp 92-106) **Human cognition.** Norman, D.A. (Univ. of California, San Diego). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

The study of human cognition encompasses the study of all mental phenomena, from the receipt and interpretation of sensory information to the final control of the motor system in the performance of action. The cognitive scientist examines all intermediary processes, including thought, decision making, and memory and including the effects of motivation, states of arousal and stress, the study of language, and the effects of social factors. The field therefore ranges over an enormous territory, covering all that is known or that should be known about human behavior. It is not possible to summarize the current state of knowledge about cognition with any great confidence that we know the correct answer about any aspect of the work. Nontheless, models provide good characterizations of certain aspects of the data and situations. Even if these models should prove to be incorrect, they do provide good approximate descriptions of people's behavior in some situations, and these approximations will still apply even when the underlying theories have changed. A quick description is provided of models within a number of areas of human cognition and skill and some general theoretical frameworks with which to view human cognition. The frameworks are qualitative descriptions that provide a way to view the development of more detailed, quantitative models and, most important, a way of thinking about human performance and skill.

23563 (NUREG/CR—3114, pp 107-116) **Role of conceptual models in nuclear power plant operation.** Williams, M.D.; Moran, T.P.; Brown, J.S. (Xerox Palo Alto Research Center, CA). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

A crucial objective in plant operation (and perhaps licensing) ought to be to explicitly train operators to develop, perhaps with computer aids, robust conceptual models of the plants they control. The question is whether we are actually able to develop robust conceptual models and validate their robustness. Cognitive science is just beginning to come to grips with this problem. This paper describes some of the evolving technology for building conceptual models of physical mechanisms and some of the implications of such models in the context of nuclear power plant operation.

23564 (NUREG/CR—3114, pp 117-123) **Outline of a model of human problem solving in failure situations.** Rouse, W.B. (Search Technology, Inc., Norcross, GA). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

The possibility of failures is the primary reason for having humans monitor automatically controlled processes. If hardware and software failures could not occur and if the automation were capable of handling all contingencies, then human operators would be unnecessary. However, failures and design limitations are quite possible and, therefore, a primary task of the human operator is to detect these events and deal with them appropriately. If the current trends continue, this task will come to dominate the human's responsibilities. It seems reasonable to make the general claim that the manual activities of the human operator will increasingly be supplanted by problem-solving activities. The objective of this paper is to outline an overall model of human problem solving in detecting and diagnosing system failures and compensating for them.

23565 (NUREG/CR—3114, pp 125-145) **Cognitive models embedded in system simulation models.** Siegel, A.I.; Wolf, J.J. (Applied Psychological Services, Inc., Wayne, PA). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

If we are to discuss and consider cognitive models, we must first come to grips with two questions: (1) What is cognition; (2) What is a model. Presumably, the answers to these questions can provide a basis for defining a cognitive model. Accordingly, this paper first places these two questions into perspective. Then, cognitive models are set within the context of computer simulation models and a number of computer simulations of cognitive processes are described. Finally, pervasive issues are discussed vis-a-vis cognitive modeling in the computer simulation context.

23566 (NUREG/CR—3114, pp 147-155) **Rule-based approach to cognitive modeling of real-time decision making.** Thorndyke, P.W. (Perceptronics, Inc., Menlo Park, CA). 1982. NTIS, PC A10/MF A01 - GPO. Order Number DE83006002.

From Workshop on congnitive modeling of nuclear plant control room operators; Dedham, MA, USA (15 Aug 1982).

Portions are illegible in microfiche products.

Recent developments in the fields of cognitive science and artificial intelligence have made possible the creation of a new class of models of complex human behavior. These models, referred to as either expert or knowledge-based systems, describe the high-level cognitive processing undertaken by a skilled human to perform a complex, largely mental, task. Expert systems have been developed to provide simulations of skilled performance of a variety of tasks. These include problems of data interpretation, system monitoring and fault isolation, prediction, planning, diagnosis, and design. In general, such systems strive to produce prescriptive (error-free) behavior, rather than model descriptively the typical human's errorful behavior. However, some research has sought to develop descriptive models of human behavior using the same theoretical frameworks adopted by expert systems builders. This paper presents an overview of this theoretical framework and modeling approach, and indicates the applicability of such models to the development of a model of control room operators in a nuclear power plant. Such a model could serve several beneficial functions in plant design, licensing, and operation.

23567 (UCID—19475) **Human-factors engineering control-room design review/audit report: Byron Generating Station, Commonwealth Edison Company.** Savage, J.W. (Lawrence Livermore National Lab., CA (USA)). 10 Mar 1983. Contract W-7405-ENG-48. 49p. NTIS, PC A03/MF A01. Order Number DE83009219.

A human factors engineering design review/audit of the Byron Unit 1 control room was performed at the site on November 17 through November 19, 1981. This review was accomplished using the Unit 2 control room appropriately mocked-up to reflect design changes already committed to be incorporated in Unit 1. The report was prepared on the basis of the HFEB's audit of the applicant's Preliminary Design Assessment report and the human factors engineering design review performed at the site. This design review was carried out by a team from the Human Factors Engineering Branch, Division of Human Factors Safety. The review team was assisted by consultants from BioTechnology, Inc. (Falls Church, Virginia), and from Lawrence Livermore National Laboratory (University of California), Livermore, California.

23568 (UCID—19700) **Human-factors engineering control-room design review/audit: Waterford 3 SES Generating Station, Louisiana Power and Light Company.** Savage, J.W. (Lawrence Livermore National Lab., CA (USA)). 10 Mar 1983. Contract W-7405-ENG-48. 60p. NTIS, PC A04/MF A01. Order Number DE83009217.

A human factors engineering design review/audit of the Waterford-3 control room was performed at the site on May 10 through May 13, 1982. The report was prepared on the basis of the HFEB's review of the applicant's Preliminary Human Engineering

Discrepancy (PHED) report and the human factors engineering design review performed at the site. This design review was carried out by a team from the Human Factors Engineering Branch, Division of Human Factors Safety. The review team was assisted by consultants from Lawrence Livermore National Laboratory (University of California), Livermore, California.

23569 **(UCID—19702) Tables of cross references among SECY 82-111, NUREG 0700, NUREG 0835, NUREG 0801.** Savage, J.W. (Lawrence Livermore National Lab., CA (USA)). 10 Mar 1982. Contract W-7405-ENG-48. 48p. NTIS, PC A03/MF A01. Order Number DE83009180.

This memorandum cross references topical statements extracted from four NRC documents that are useful for guidance in reviewing the Human Factors Engineering designs of main control rooms and control centers outside the main control rooms.

23570 **A method for analysis of reactivity insertion accidents in transient reactors.** Rudolph, R.R.; Bhattacharyya, S.K. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 615-616(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23571 **Development and evaluation of a graphic display system for BWRs.** Yarrington, P. (Sandia National Laboratories, Albuquerque, NM 87185). *Transactions of the American Nuclear Society;* **41**: 525(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

2205 Environmental Aspects

23572 **(ANL/NESC—964) XOQDOQ; nuclear power plant effluent releases.** Shields, J. (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Automatic Data Processing). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048964.

Maxima of - 30 receptor locations 14 velocity categories 7 stability categories 5 release exit points 5 receptor types.

XOQDOQ was designed for meteorological evaluation of routine releases from commercial nuclear power reactors. It calculates average relative effluent concentrations and average relative deposition values at locations specified by the user and at standard radial distances and segments for downwind sectors. It also calculates these values at the specified locations for intermittent releases.IBM370,303x; FORTRAN IV; OS/370; 240K bytes of memory are required to execute the sample problem..

23573 **(CONF-810545—8) Mathematical modelling of thermal-plume interaction at Waterford Nuclear Power Station.** Tsai, S.Y.H. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83008514.

From 3. conference on waste heat management and utilization; Miami, FL, USA (12 May 1981).

Portions are illegible in microfiche products.

The Waldrop plume model was used to analyze the mixing and interaction of thermal effluents in the Mississippi River resulting from heated-water discharges from the Waterford Nuclear Power Station Unit 3 and from two nearby fossil-fueled power stations. The computer program of the model was modified and expanded to accommodate the multiple intake and discharge boundary conditions at the Waterford site. Numerical results of thermal-plume temperatures for individual and combined operation of the three power stations were obtained for typical low river flow (200,000 cfs) and maximum station operating conditions. The predicted temperature distributions indicated that the surface jet discharge from Waterford Unit 3 would interact with the thermal plumes produced by the two fossil-fueled stations. The results also showed that heat recirculation between the discharge of an upstream fossil-fueled plant and the intake of Waterford Unit 3 is to be expected. However, the resulting combined temperature distributions were found to be well within the thermal standards established by the state of Louisiana.

23574 **(NUREG/CR—2925) In-plant considerations for optimal offsite response to reactor accidents.** Burke, R.P.; Heising, C.D.; Aldrich, D.C. (Massachusetts Inst. of Tech., Cambridge (USA); Sandia National Labs., Albuquerque, NM (USA)). Nov 1982. Contract AC04-76DP00789. 150p. (SAND—82-2004). NTIS, PC A07/MF A01 - GPO. Order Number DE83008184.

Portions are illegible in microfiche products.

Offsite response decision-making methods based on in-plant conditions are developed for use during severe reactor-accident situations. Dose projections are used to eliminate all LWR plant systems except the reactor core and the spent-fuel storage pool from consideration for immediate offsite emergency response during accident situations. A simple plant information-management scheme is developed for use in offsite response decision-making. Detailed consequence calculations performed with the CRAC2 model are used to determine the appropriate timing of offsite-response implementation for a range of PWR accidents involving the reactor core. In-plant decision criteria for offsite-response implementation are defined. The definition of decision criteria is based on consideration of core-accident physical processes, in-plant accident monitoring information, and results of consequence calculations performed to determine the effectiveness of various public-protective measures. The benefits and negative aspects of the proposed response-implementation criteria are detailed.

2206 Research, Test, And Experimental Reactors

REFER ALSO TO CITATION(S) 23193, 23443, 23570, 23604, 23645

23575 **(CONF-810233—2) US RERTR program, its fuel-development activities, and application in the KUHFR.** Travelli, A.; Stahl, D. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 29p. NTIS, PC A03/MF A01. Order Number DE83008619.

From 3. Pacific Basin conference; Acapulco, Mexico (16 Feb 1981).

Portions are illegible in microfiche products.

The goals, structure, and accomplishments to date of the Reduced Enrichment Research and Test Reactor (RERTR) Program are described in detail. Plans and schedules for future program activities are outlined with the effect which these activities may potentially have on the research-reactor community. The fuel-development activities of the program are discussed in detail, with particular emphasis on the new low-enrichment, high-uranium-density fuels which the RERTR Program is developing for application in research reactors in the near future. The results of a joint study program between the RERTR Program and the Kyoto University Research Reactor Institute (KURRI), aimed at converting the Kyoto University High-Flux Reactor (KUHFR) to the use of reduced-enrichment uranium, are presented. It is shown that the study has resulted in a positive decision and in a cooperative, well-structured plan for the KUHFR conversion.

23576 **(CONF-820420—12) Effect of reduced enrichment on the fuel cycle for research reactors.** Travelli, A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007775.

From International ENS/ANS conference on nuclear energy with emphasis on fuel cycles; Brussels, Belgium (26 Apr 1982).

The new fuels developed by the RERTR Program and by other international programs for application in research reactors with reduced uranium enrichment (<20% EU) are discussed. It is shown that these fuels, combined with proper fuel-element design and fuel-management strategies, can provide at least the same core residence time as high-enrichment fuels in current use, and can frequently significantly extend it. The effect of enrichment reduction on other components of the research reactor fuel cycle, such as uranium and enrichment requirements, fuel fabrication, fuel shipment, and reprocessing are also briefly discussed with their economic implications. From a systematic comparison of HEU and

LEU cores for the same reference research reactor, it is concluded that the new fuels have a potential for reducing the research reactor fuel cycle costs while reducing, at the same time, the uranium enrichment of the fuel.

23577 **Steady-state simulation of the FFTF in-vessel thermal hydraulics.** Vanka, S.P.; Domanus, H.M.; Sha, W.T. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 703-706(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23578 **Flux distortion effects in the diagnostic cores phase 1 assembly.** Robinson, W.R.; Dilorio, G.J. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 576-578(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

2209 Reactor Safety

REFER ALSO TO CITATION(S) 23196, 23528, 23570, 23574, 24249

23579 **(ANL/NESC—767) BEACON/MOD3; containment system fluid flow.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Sahota, M.S. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048767.

BEACON/MOD3 does not have pressure suppression containment models. The Eulerian computational equations have been modified for the variable nodalization of a mesh with the spatial dimensions of each cell stored in row-wide and column-wide arrays. Reference reports, NUREG/CR-1148, INEL-IGS Programming Guide.

The BEACON series of programs is designed to perform a best-estimate analysis of the flow of a mixture of air, water, and steam in a nuclear reactor containment system under loss-of-coolant accident conditions. The code can simulate two-component, two-phase fluid flow in complex geometries using a combination of two-dimensional, one-dimensional, and lumped-parameter representations for the various parts of the system. BEACON/MOD3 contains mass and heat transfer models for wall film and for wall conduction, and is suitable for the evaluation of short-term transients in PWR dry containment systems. The capability to examine the details of a two-component, two-phase flow field in one or two dimensions under nonhomogeneous, nonequilibrium conditions (unequal velocities, unequal temperatures between the two phases) allows analysis of such problems as the calculation of jet impact forces of a fluid leaving a pipe break, the motion of a large pressure wave across a compartment, the variation in flow properties as air is displaced from a compartment by steam and water, the water entrainment or deentrainment by a high-speed vapor flow, the flow of a flashing liquid, and many other complex nonequilibrium problems of containment system analyses.CDC CYBER176;CDC7600; FORTRAN IV (98%) and COMPASS (2%); NOS/BE (CDC CYBER176), SCOPE 2.1 (CDC7600); 120,000 (octal) words of SCM and 34,000 (octal) words of LCM for the largest of the eight sample problems. The LCM required is a function of the program size (i.e., the number of nodes or computational cells) and is dynamically allocated by the BEACON code.

23580 **(ANL/NESC—778) PROSA2; probabilistic response surface studies.** Vaurio, J.K. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048778.

PROSA2 is an implementation of the probabilistic response surface technique developed for obtaining probability distributions of the consequences of postulated nuclear reactor accidents. The problem is to find the distribution of a random variable that is a function of many other random variables when this functionality is not known in analytical form and can be obtained only numerically through parametric studies with a deterministic computer code. The program performs the following three main functions: (a) Selects values for the input parameters of a deterministic computer code from an input-specified region of interest. The regions are defined by probability distributions and confidence intervals. The program arranges the input values into combinations called "knot-points". (b) With output values ("consequences") from the deterministic code for each input-parameter combination, determines response surfaces approximating the functionality between the input and output of the deterministic code. (c) Calculates the probability distribution of the output (consequence) variable as a histogram using Monte Carlo sampling. Step (a) is omitted if the user uses his own design of knot-points. Both steps (a) and (b) can be omitted if a known analytical function is to be sampled. PROSA2 has been used mainly in conjunction with accident-analysis codes, but the methods and the programming are completely general and not limited to such applications.IBM370; FORTRAN IV (95%) and Assembly language (5%); OS/370; 370K bytes of storage, system input, output, and punch units are required.

23581 **(ANL/NESC—780) NALAP; LMFBR transient response to accident.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Maise, G. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048780.

Maxima of 40 control volumes, 50 connecting junctions, 6 thermal properties, 25 pressures, 13 liquid temperatures per pressure, 6 gas temperatures per pressure Pressure table values must be greater than zero and less than or equal to 7000 psia. Reference report, BNL 50457.

NALAP is an LMFBR system transient code. This code, adapted from the light water reactor transient code RELAP3B, simulates thermalhydraulic response of sodium-cooled fast breeder reactors when subjected to postulated accidents such as a massive pipe break as well as a variety of other upset conditions that do not disrupt the system geometry.CDC7600,CYBER76; FORTRAN IV (99%) and COMPASS (1%); SCOPE 2.1; CDC7600 (or CYBER76) with 142,000 (octal) words of memory. In addition to card input and printer output, a FORTRAN logical unit 1 may be used for the automatic time-step option, and units 2, 3, and 4 may be used under the restart option. These units may be assigned to disk or tape.

23582 **(ANL/NESC—797) HAARM3; aerosol behavior log-normal dist model.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Reed, L.D. (Battelle Columbus Labs., OH (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048797.

Maxima of 1000 time-steps, 42 discrete radii for the distribution calculations. Reference report, BMI-NUREG-1991.

HAARM3, an acronym for Heterogeneous Aerosol Agglomeration Revised Model 3, is the third program in the HAARM series developed to predict the time-dependent behavior of radioactive aerosols under postulated LMFBR accident conditions. HAARM3 was developed to include mechanisms of aerosol growth and removal which had not been accounted for in the earlier models. In addition, experimental measurements obtained on sodium oxide aerosols have been incorporated in the code. As in HAARM2, containment gas temperature, pressure, and temperature gradients normal to interior surfaces are permitted to vary with time. The effects of reduced density on sodium oxide agglomerate behavior and of nonspherical shape of particles on aerosol behavior mechanisms are taken into account, and aerosol agglomeration due to turbulent air motion is considered. Also included is a capability

to calculate aerosol concentration attenuation factors and to restart problems requiring long computing times.CDC6400,7600,CYBER73; FORTRAN IV, FTN4.5 (CDC7600); NOS/BE 1.0 (CDC CYBER73), SCOPE 2.1.3 (CDC7600); 117,000 (octal) words of storage are required.

23583 **(ANL/NESC—804) CHART; iodine decay heat on charcoal adsorbers.** Shields, R.P.; Siman-Tov, M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048804.

CHART is limited to maxima of 1750 lattice points, 100 regions, 50 materials, 50 boundary conditions, 100 fine lattice lines along any axis, 50 gross lattice lines along any axis, 20 heat generation functions, 25 initial temperature functions, 50 position-dependent functions, 20 time-dependent functions. Reference report, ORNL-4602.

CHART was developed for the thermal analysis of the charcoal adsorber in a reactor containment system; maximum temperatures caused by iodine adsorption under accident conditions are estimated. A differential equation relating the charcoal slab temperature to the heat generation rate, air flow rate, and the heat parameters of air and charcoal is solved in both one and three dimensions. Principal consideration is given very low flow rates and times soon after accident onset, the conditions which pose the greatest threat to the charcoal.IBM360,370,303x; FORTRAN IV; OS/360,370; CHART requires approximately 465K bytes of storage for execution and the standard input and output units.

23584 **(ANL/NESC—818) CONTEMPT4/MOD2; multicompartment containment.** Metcalfe, L.J. (EDS Nuclear, Inc., San Francisco, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048818.

Maxima of 999 lumped parameter compartments, 999 input tables, 99 intercompartment flow junctions, 99 of most other containment features. Reference report, TREE-NUREG0-1202.

CONTEMPT4/MOD2 describes the long-term behavior of multicompartment pressurized water reactor (PWR) containment systems and experimental containment systems subjected to postulated loss-of-coolant accident (LOCA) conditions. The program calculates the time variation of compartment pressures, temperatures, mass and energy inventories, heat structure temperature distributions, and intercompartment mass and energy exchange based on user-supplied values for compartment descriptions, time-step and edit controls, and selected problem features. Analytical models available to describe containment systems include models for containment fans and pumps, cooling sprays, fan coolers, heat conducting structures, sump drain, and PWR ice condensers. Optional automatic time-step control allows the code to determine time-step sizes within limits dictated by the user.CDC7600; FORTRAN IV (96%) and COMPASS (4%); SCOPE 2.1; 160,000 (octal) small core memory (SCM) and 100,000 (octal) large core memory (LCM) are required for CONTEMPT4 compilation. CalComp or FR80 plotting devices are needed for graphical output.

23585 **(ANL/NESC—836) TRAC-PD2/MOD1; best-estimate analysis PWR LOCA.** Harper, R. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048836.

TRAC-PD2/MOD1 performs best-estimate analyses of loss-of-coolant accidents and other transients in pressurized light water reactors. The program can also be used to model a wide range of thermal-hydraulic experiments in reduced-scale facilities. Models employed include reflood, multi-dimensional two-phase flow, nonequilibrium thermodynamics, generalized heat transfer, and reactor kinetics. Automatic steady-state and dump/restart capabilities are provided. The changes reported in TRACNEWS issues through Number 5 are incorporated in this release.CDC7600; FORTRAN IV (FTN 4.5 FORTRAN compiler) with selected COMPASS replacement routines; SCOPE 2.1.5; CDC7600 with approximately 62K words of small core memory (SCM) and 131K words of large core memory (LCM).

23586 **(CONF-810905—41) Structures for common-cause failure analysis.** Vaurio, J.K. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008505.

From ANS/ENS topical meeting on probabilistic risk assessment; Post Chester, NY, USA (20 Sep 1981).

Common-cause failure methodology and terminology have been reviewed and structured to provide a systematical basis for addressing and developing models and methods for quantification. The structure is based on (1) a specific set of definitions, (2) categories based on the way faults are attributable to a common cause, and (3) classes based on the time of entry and the time of elimination of the faults. The failure events are then characterized by their likelihood or frequency and the average residence time. The structure provides a basis for selecting computational models, collecting and evaluating data and assessing the importance of various failure types, and for developing effective defences against common-cause failure. The relationships of this and several other structures are described.

23587 **(CONF-820406—27) DN detection during SLSF tests.** Braid, T.H.; Harper, H.A.; Wilson, R.E.; Baldwin, R.D.; Gilbert, D.M.; Baxter, D.E.; Gillins, R.L.; Jeffries, G.L. (Argonne National Lab., IL (USA); EG and G Idaho, Inc., Idaho Falls (USA)). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83008528.

From ANS topical meeting on fast, thermal and fusion reactor experiments; Salt Lake City, UT, USA (12 Apr 1982).

Portions are illegible in microfiche products.

During two tests in the Sodium Loop Safety Facility (W2 and P4), two systems were operated to detect delayed neutrons from exposed fuel. One monitored directly the sodium in the in-pile loop with a transit delay from the flux region of ~2 seconds; the other conducted a sample stream of sodium to external detectors with a transit delay which could be varied from ~10 to ~ 40 seconds. Detectors of a wide range of sensitivity were operated in pulse and current mode; DN signals varying from <1 mm^2 recoil to many grams of molten fuel could be recorded reliably without saturation. During the W2 and P4 tests a continuous DN record was made. Massive fuel failure signals were observed during reactor transients in both tests, including events interpreted as fuel melting and exposure of large areas. The steady signal from the blockage in P4 was studied as a function of reactor power and sodium temperature.

23588 **(CONF-820604—14) Analyses with the FSTATE code: fuel performance in destructive in-pile experiments.** Bauer, T.H.; Meek, C.C. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 23p. NTIS, PC A02/MF A01. Order Number DE83008624.

From AIAA/ASME joint conference on fluids, plasma, thermophysics and heat transfer; St Louis, MO, USA (7 Jun 1982).

Thermal-mechanical analysis of a fuel pin is an essential part of the evaluation of fuel behavior during hypothetical accident transients. The FSTATE code has been developed to provide this required computational ability in situations lacking azimuthal symmetry about the fuel-pin axis by performing 2-dimensional thermal, mechanical, and fission gas release and redistribution computations for a wide range of possible transient conditions. In this paper recent code developments are described and application is made to in-pile experiments undertaken to study fast-reactor fuel under accident conditions. Three accident simulations, including a fast and slow ramp-rate overpower as well as a loss-of-cooling accident sequence, are used as representative examples, and the interpretation of STATE computations relative to experimental observations is made.

23589 **(CONF-820704—37) Analysis of recent fuel-disruption experiments.** Kramer, J.M.; Kraft, T.E.; DiMelfi, R.J.; Fenske, G.R.; Gruber, E.E. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83008467.

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

Portions are illegible in microfiche products.

Recent USDOE-sponsored DEH, FGR, and TREAT F series fuel-disruption experiments are analyzed with existing analytical models. The experiments are interpreted and the results used to evaluate the models. Calculations are presented using the FRAS3 fission-gas-behavior code and the DiMelfi-Deitrich fuel-response model.

23590 **(CONF-820704—38) PFR/TREAT programme: objectives, progress and future work.** Cowking, C.B.; Alter, H.; Hewison, R.; Borys, S.S.; Wood, M.H.; Culley, G.E.; Woods, W.J.; Klickman, A.E. (UKAEA Risley Nuclear Power Development Establishment; USDOE, Washington, DC; UKAEA Dounreay Nuclear Power Development Establishment; Argonne National Lab., IL (USA); UKAEA Atomic Energy Research Establishment, Harwell; Hanford Engineering Development Lab., Richland, WA (USA); UKAEA Atomic Energy Establishment, Winfrith). 1982. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83008466.

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

The PFR/TREAT collaborative program of fast-reactor fuel testing is described and the objectives are illustrated in terms of the parameters selected for the irradiation of US and UK full-length fuel pins in PFR, followed by safety testing in TREAT. The measurements being made before, during, and after testing are outlined and the equipment and facilities being used in the UK and USA are described. An outline is given of the progress made and results obtained since the beginning of the collaboration in November 1979, together with future schedules for irradiation and testing. More-detailed results from the first two tests are given in a companion paper.

23591 **(CONF-820704—39) Selection of low-risk design guidelines for energetic events.** Ferguson, D.; Marchaterre, J.; Graham, J. (Argonne National Lab., IL (USA); Westinghouse Electric Corp., Madison, PA (USA). Advanced Reactors Div.). 1982. Contract W-31-109-ENG-38. 14p. NTIS, PC A02/MF A01. Order Number DE83008530.

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

Portions are illegible in microfiche products.

This paper recommends the establishment of specific design guidelines for protection against potential, but low-probability, energetic events. These guidelines recognize the plant protective features incorporated to prevent such events, as well as the inherent capability of the plant to accommodate a certain level of energy release. Further, their application is recommended within the context of necessary standardized and agreed-upon acceptance criteria which are less restrictive than ASME code requirements. The paper provides the background upon which the selection of the design is made, including the characterization of energetic events dependent on various core-design parameters, and including the necessity of a low-risk design balanced between prevention of accidents and the mitigation of consequences.

23592 **(CONF-820704—40) Status and validation of the SAS4A accident-analysis code system.** Wider, H.U.; Bordner, G.L.; Briggs, L.L.; Cahalan, J.E.; Dunn, F.E.; Miles, K.J.; Morris, E.E.; Prohammer, F.G.; Tentner, A.M.; Weber, D.P. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83008531.

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

The SAS4A code system is a new tool for analyzing the initial phase of Hypothetical Core Disruptive Accidents (HCDAs) up to gross melting or failures of the subassembly walls. The objective in the development of SAS4A is to provide improved analytical models which represent experimentally demonstrated modes of material response in such accident scenarios. This paper discusses recent improvements in the phenomenological models, gives examples of verification and validation efforts that have been conducted, and illustrates the whole core-analysis implications of using this refined modeling capability.

23593 **(CONF-820704—41) PFR/TREAT CO1 and LO1 experiments.** Tylka, J.P.; Wright, A.E.; Pember, L.A.; Culley, G.C.; Davies, A.L.; Herbert, R.; Hill, D.J.; Woods, W.J.; Wood, M.H. (Argonne National Lab., IL (USA); Westinghouse Hanford Co., Richland, WA (USA); UKAEA Atomic Energy Establishment, Winfrith; UKAEA Atomic Energy Research Establishment, Harwell). 1982. Contract W-31-109-ENG-38. 12p. NTIS MF A01. Order Number DE83008465.

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

Microfiche only, copy does not permit paper copy reproduction.

The CO1 and LO1 TREAT experiments were the first two in a series of international fast-reator safety experiments to be conducted as part of the PFR/TREAT program being performed by the US and the UK. Conditions for these two experiments simulated a large fast-reactor hypothetical 5$/second (150 ms period) transient overpower (TOP) accident. The CO1 configuration was a single fuel pin in a NaK filled capsule while LO1 used a seven-pin bundle in a flowing-sodium loop. The fuel pins in both experiments had no prior irradiation and represented the PFR driver fuel. The CO1 and LO1 experiments were performed on November 5 and November 24, 1980, respectively. This paper describes the objectives, test articles, experimental approach, and the major observations. Post-transient examination results and fuel-failure modeling studies are also presented.

23594 **(CONF-820704—42) Phenomenological studies of HCDA issues.** Spencer, B.W.; Cho, D.H. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83008464.

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

A framework for examining whole-core accident phenomena during the time interval beginning with loss-of-intact geometry up to the time of post-accident heat removal is presented in terms of four distinct stages of disruption: (1) disruption initiation, (2) meltout stage, (3) integral pool stage, and (4) termination stage. Each of the accident stages is further described in terms of four characteristic categories of phenomena which comprise the principle generic issues being studied: (a) the failure of restraining boundaries, (b) fuel dispersal, (c) fuel-coolant thermal interactions, and (d) fuel (pool) behavior with continued fission/decay heating. Current programs of out-of-pile experiments and related modeling addressing these issues at ANL are described.

23595 **(CONF-820704—43) Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory.** Stein, R.P.; Farhadieh, R.; Pedersen, D.R.; Gunther, W.H.; Purviance, R.T. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83008463.

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

Experimental work at Argonne is being performed to investigate the long-term molten-core-debris retention capability of the ex-vessel cavity following a postulated meltdown accident. The eventual objective of the work is to determine if normal structural material (concrete) or a specifically selected sacrificial material (MgO) located in the ex-vessel cavity region can effectively contain molten core debris. The materials under investigation at ANL are various types of concrete (limestone, basalt and magnetite) and commercially-available MgO brick. Results are presented of the status of real material experimental investigation at ANL into (1) molten UO_2 pool heat transfer, (2) long-term molten UO_2 penetration into concrete and (3) long-term molten UO_2 penetration into refractory substrates. The decay heating in the fuel has been simulated by direct electrical heating permitting the study of the long-term interaction.

23596 **(CONF-820717—5) Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium.** Sowa, E.S.; Pedersen, D.R.; Pavlik, J.; Purviance, R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008649.

From PAHR information exchange conference; Karlsruhe, F.R. Germany (28 Jul 1982).

Real materials experiments in heat transfer through beds of UO_2 in sodium have been performed at Argonne National Laboratory over a period of years. The most recent method utilizes the resistive heating in a sheet tungsten filament located at the base of the debris container. A schematic diagram of the apparatus is shown. The tungsten is clamped between two water cooled copper electrodes. The filament is a sheet of tungsten 0.15 mm thick, 5 cm wide and 18 cm long. Two 6.5 mm thick sheets of boron nitride sandwich the filament. The upper face of the upper boron nitride sheet is in intimate contact with the bottom of the debris container. Temperatures are measured at various levels in the bed as well as in the boron nitride plate. In addition, the sodium pool temperature is measured by the thermocouple. The heat transferral through the bed is measured by the temperature difference and mass flowrate in a NaK condenser located above the debris bed. The NaK inlet and outlet temperatures are recorded individually, as well as, differentially.

23597 **(CONF-820717—6) Interaction and penetration of heated UO_2 with limestone concrete.** Farhadieh, R.; Pedersen, D.R.; Purviance, R.; Carlson, N. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008500.

From PAHR information exchange conference; Karlsruhe, F.R. Germany (28 Jul 1982).

To safeguard the environment against radiological releases, the major question of concern in PAHR safety assessment, following an HCDA, involves confinement and dilution of the molten core-debris. Significant to the study is the directional growth of the core-debris in the concrete foundation of the reactor building or the concrete below the reactor cavity. The real material experiments were carried out in the test apparatus shown. Casts of CRBRP limestone concrete were prepared in graphite cylinders, each having an internal diameter of 8.9 cm and a depth of 30.5 cm. The 17.8-cm-deep concrete samples were allowed to cure for at least 28 days. Experiments were conducted within two months of curing time. The cavity above concrete was packed with 3 kg of pure UO_2 particles (1 to 3 mm). A uranothermic mixture was placed on the top of UO_2 powder. Heating and possible melting of UO_2 was achieved resistively after the ignition of the thermite. Total experimental time was about 60 minutes, during which time a maximum electrical power input of 1.8 watts/gr was applied to the UO_2. Three gas samples were taken at temperatures of 100, 600, and 950°C, measured in the plane of the No. 2 thermocouple. Selection of three temperatures were to study the amount and the type of gases released from different phases of concrete.

23598 **(CONF-820717—7) Effect of particle stratification on debris-bed dryout.** Gabor, J.D.; Cassulo, J.C.; Pederson, D.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008550.

From PAHR information exchange conference; Karlsruhe, F.R. Germany (28 Jul 1982).

Significant work has been performed on debris-bed dryout on beds of either uniformly sized particles or particles of a wide size range which are well mixed. This work has provided an understanding of the mechanisms of dryout and an empirical basis for containment analysis. However, the debris bed resulting from a HCDA would not consist of uniformly sized particles and for certain scenarios the bed could be stratified rather than well mixed. Tests have been conducted on the effect of particle size distribution on dryout and concluded that not only is the mean particle size an important parameter but also the standard deviation of the distribution and change in porosity. The D6 in-pile test at Sandia with a 114-mm deep stratified bed resulted in a reduced dryout heat flux compared to a uniformly mixed bed. Because of the many questions concerning the dryout behavior of stratified beds of wide size distribution out-of-pile experiments in which metal particles in water pools are inductively heated were initiated at Argonne.

23599 **(CONF-820717—8) Application of debris-bed dryout data to CONACS-1 modeling.** Gabor, J.D.; Cassulo, J.C.; Pedersen, D.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008551.

From PAHR information exchange conference; Karlsruhe, F.R. Germany (28 Jul 1982).

CONACS-1 (the first version of the DOE Containment Analysis Code System) which is currently under development requires extension of existing debris-bed dryout data to the wide range of conditions possible in an accident sequence. While there has been much effort on modeling of debris-bed dryout from first principles, there is no definitive model for beds of irregularly shaped particles of wide size distribution and for beds of varying heights. Existing debris-bed heat-transfer data with real materials are for the most part limited to dryout as a function of bed depth for adiabatic conditions of atmospheric pressure. These data must be extrapolated with the use of appropriate theoretical models based on experimentation with simulant materials to the ocnditions under consideration in the containment analysis. The data base selected for CONACS-1 is from measurements of dryout for beds of 100 to 1000 μm UO_2 with the sodium phase Joule heated. This particle size range which is typical for debris from fuel-coolant interactions is the most reasonable to use.

23600 **(CONF-820810—17) PWR systems transient analysis: a reactor-safety perspective.** Kennedy, M.F.; Abramson, P.B.; McDonald, T.A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83008682.

From 10. international mathematics and computers simulation congress on systems simulation and scientific computation; Montreal, Canada (9 Aug 1982).

In the simulation of transient events in large PWR reactor systems for reactor safety studies, the plant model is quite detailed and must include most of the plant components and control systems to adequately analyze the range of transients. The results discussed were calculated with the RELAP4/MOD6 code and reveal the need for the analysis to carefully review and understand the results to assure that they are not being adversely affected by the improper solution techniques or changes in models during the calculation.

23601 **(CONF-820810—18) Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior.** Chung, K.S.; Abramson, P.B.; Kennedy, M.F.; Kim, J.S. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83008683.

From 10. international mathematics and computers simulation congress on systems simulation and scientific computation; Montreal, Canada (9 Aug 1982).

This paper presents a series of modeling experiences and problems in simulating the thermal-hydraulic behavior of large PWR steam generators using the RELAP4 and RELAP5 computer codes. Sensitivity studies investigating the heat transfer characteristics of both once-through and U-tube steam generators are discussed. Suggestions and recommendations are given for effective use and potential future improvements of these codes.

23602 **(CONF-820814—39) Status of fast-breeder-reactor safety.** Avery, R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008669.

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

The current state of knowledge of fast breeder reactors is reviewed. The primary focus on the analysis of postulated accident sequences and the implications to fast-reactor design. The accidents considered include loss-of-collant flow and transient overpower, both with a postulated failure to scram. The associated accident phenomena considered largely relate to the potential for energetic disassembly and include fuel, clad, and coolant motions during the

accident sequence, fuel-coolant thermal interactions, and potential recriticality phenomena.

23603 **(CONF-820962—4) Scaling criteria for LWR's under single-phase and two-phase natural circulation.** Ishii, M.; Kataoka, I. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 39p. NTIS, PC A03/MF A01. Order Number DE83007721.

From NRC/ANS meeting on basic thermal hydraulic mechanisms in LWR analysis; Bethesda, MD, USA (14 Sep 1982).

Scaling criteria for a natural circulation loop under single-phase and two-phase flow conditions have been derived. For a single-phase case the continuity, integral momentum, and energy equations in one-dimensional area average forms have been used. From this, the geometrical similarity groups, friction number, Richardson number, characteristic time constant ratio, Biot number, and heat source number are obtained. The Biot number involves the heat-transfer coefficient which may cause some difficulties in simulating the turbulent-flow regime. For a two-phase-flow case, the similarity groups obtained from a perturbation analysis based on the one-dimensional drift-flux model have been used. The physical significance of the phase-change number, subcooling number, drift-flux number, friction number are discussed and conditions imposed by these groups are evaluated. In the two-phase-flow case, the critical heat flux is one of the most-important transients which should be simulated in a scale model. The above results are applied to the LOFT facility in case of a natural-circulation simulation.

23604 **(CONF-821155—7) Release of fission products from irradiated aluminide fuel at high temperature.** Shibata, T.; Kanda, K.; Mishima, K. (Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.; Argonne National Lab., IL (USA); Oak Ridge National Lab., TN (USA)). 1982. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83007956.

From International meeting on research and test reactor core conversions from HEU to LEU fuels; Argonne, IL, USA (8 Nov 1982).

Portions are illegible in microfiche products.

Irradiated uranium aluminide fuel plates of 40% U-235 enrichment were heated for the determination of fission products released under flowing helium gas at temperatures up to and higher than the melting point of fuel-cladding material. The release of fission products from the fuel plate at temperature below 500°C was found negligible. The first rapid release of fission products was observed with the occurrence of blistering at 561 +- 1°C on the plates. The next release at 585°C might be caused by melting of the cladding material of 6061-Al alloy. The last release of fission product gases was occurred at the eutectic temperature of 640°C of U-Al/sub x/. The released material was mostly xenon, but small amounts of iodine and cesium were observed.

23605 **(CONF-8110112—2) Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations.** Tentner, A.M.; Wider, H.U. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008699.

From Specialists' meeting on liquid metals thermal hydraulics; Cambridge, MA, USA (5 Oct 1981).

This paper presents the thermal-hydraulic aspects of current interest in the modeling of LMFBR hypothetical core-disruptive accidents, with special emphasis on the Loss of Flow situations. The models presented have been incorporated in LEVITATE, a code for the analysis of fuel and cladding dynamics under LOF conditions, which has recently become part of the SAS4A code system. The influence of different thermal-hydraulic models on fuel motion is illustrated by a comparison between the results calculated by LEVITATE, the data from the L7-TREAT experiment and the results calculated by SLUMPY. The results calculated by LEVITATE are in fair agreement with the experimentally observed early fuel dispersal. The marginally acceptable energetic events obtained in the analysis of high void-worth LMFBR cores during Loss-of-Flow transients coupled with uncertainties about some of the thermal-hydraulic parameters motivate, among other factors, the need for the design low void-worth LMFBR cores.

23606 (DOE/NE/34087—T1-Vol.2, pp 6.1-6.6) **LOCA analysis of annular fuel pellet design for extended burnup.** Ades, M.J. (Exxon Nuclear Co., Inc., Richland, WA). 1982. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83001866.

From American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization; Williamsburg, VA, USA (4 Apr 1982).

An analysis of Exxon Nuclear Company (ENC) annular fuel pellet design for extended burnup was performed to determine the thermal response of annular pellet fuel during a postulated LOCA in a two loop pressurized water reactor (PWR). The fuel thermal response during the various phases of the LOCA is determined and compared with the thermal response of solid pellet fuel. The results indicate that the initial stored energy of annular pellet fuel is lower than that of solid pellet fuel prior to the initiation of the LOCA, and thereby represents a dominant component in the thermal performance of annular pellet fuel throughout the different portions of the LOCA transient. The resulting peak clad temperatures (PCT's) of annular pellet fuel are lower than the PCT's of solid pellet fuel for beginning-of-life (BOL) and exposed fuel conditions. These results indicate that the ENC annular fuel design is within licensing limits and constitutes an improvement over the LOCA performance of solid pellet fuel.

23607 **(EGG-TMI—5966-Rev.1) TMI-2 core-examination program: INEL facilities readiness study.** McLaughlin, T.B. (Idaho National Engineering Lab., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 83p. NTIS, PC A05/MF A01. Order Number DE83009200.

This report reviews the capability and readiness of remote handling facilities at the Idaho National Engineering Laboratory (INEL) to receive, and store the TMI-2 core, and to examine and analyze TMI-2 core samples. To accomplish these objectives, the facilities must be able to receive commercial casks, unload canisters from the casks, store the canisters, open the canisters, handle the fuel debris and assemblies, and perform various examinations. The report identifies documentation, including core information, necessary to INEL before receiving the entire TMI-2 core. Also identified are prerequisites to INEL's receipt of the first canister: costs, schedules, and a preliminary project plan for the tasks.

23608 **(EGG-TMI—6198) EPICOR-II resin/linear research plan.** McConnell, J.W. (Idaho National Engineering Lab., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 34p. NTIS, PC A03/MF A01. Order Number DE83009196.

The resin/liner research project being conducted at the Idaho National Engineering Laboratory on EPICOR-II prefilters from Three Mile Island (TMI) is discussed. The duration of that DOE funded effort as planned is three years. Technical justification is presentd to extend the plan in several areas. The contents of several of the highest loaded prefilters are used in this to investigate degradation in resin and zeolite. Solidification of resin and zeolite with Portland cement and Dow polymer and prefilter liner integrity. The degradation studies describe use of resin and zeolite samples analyzed chemically and physically for degradation. During the extended studies, the radiation dose is expected to increase from 3 x 10^8 to 10^9 rads which should result in pronounced degradation of the resin. Solidification studies are described.

23609 **(EPRI-NP—1583) BWR refill-reflood program - TRAC-BWR component development.** Aburomia, M.M. (General Electric Co., San Jose, CA (USA)). Feb 1983. 61p. (NUREG/CR—2135; GEAP—24941). NTIS, PC A04 - GPO. Order Number DE83901823.

This report describes the development of boiling water reactor (BWR) components that are necessary for the structuring of a best-estimate version of TRAC-BWR. These components are: the jet pumps, the steam separators, and the steam dryers. The component models satisfy their functional specifications and are in accordance with the Transient Reactor Analysis Code (TRAC) basic equations, numerics, and constitutive relations. The jet pump is developed from the TRAC TEE component. It is structured for both the Drift Flux - 1D TRAC versions. The model was run in steady-

state and transient operation covering all jet pump flow regimes. The results are in general agreement with experimental data. The steam separators and the steam dryers are structured as integral parts of the pressure vessel. The steam separator model utilizes an overall flow resistance scheme to separate the phases and achieve the correct pressure drop. The steam dryer model is simulated as a flow resistance to the steam flow, and the model is tailored to give the pressure drop within the dryer.

23610 **(EPRI-NP—2745) Full-scale turbine-missile concrete impact experiments. Final report.** Woodfin, R.L. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 159p. NTIS, PC A08/MF A01. Order Number DE83009251.

Portions are illegible in microfiche products.

Four full-scale experiments were conducted at Sandia National Laboratories' rocket sled facility to provide data on the response of reinforced concrete containment walls to impact and penetration by postulated turbine-produced missiles. The missiles' mass, velocity, and attitude, and the steel liner thickness, were varied. A 1476-kg, 120° segment cut from a shrunk-on turbine disc was used for three experiments, and a 2100-kg, 137° segment of another disc was used for one experiment. The targets were concrete panels fabricated of commercial ready-mix concrete of strength 24 to 28 MPa at 28 days and heavily reinforced ($\approx$ 5% by volume) with No. 18 (57-mm-dai) bars. Impacts were perpendicular to the targets at their centers. Three impacts were with the sharp corner of the missile forward (piercing) and one was with the rounded side forward (blunt). Rebar strains, liner strains, and rear face kinematic quantities were recorded for each test. Internal pressure pulses generated by the impacts were recorded on two tests. High-speed camera coverage was extensive. Depth of penetration was the primary measure diameter. Penetration depths into the 1.37-m-thick panels ranged from 33 cm for the blunt impact of the 1476-kg missile at 92 m/s to 65 cm for the piercing impact of the 2100-kg missile at 115m/s. Impact at the piercing attitude caused significantly more severe rear face cracking than did impact at the blunt attitude, but since rear face panel displacements in excess of 6 cm and velocities greater than 7 m/s were measured, results suggested that impact at a blunt attitude might cause scabbing at lower velocities than impact at a piercing attidude. In these tests, the presence of a 9.5-mm-thick steel liner on the rear face of the panel in the latter two tests precluded scabbing. Results also indicated that design formulas in common use give conservative results.

23611 **(EPRI-NP—2746) Scale modeling of turbine-missile impact into concrete. Final report.** McHugh, S.; Seaman, L.; Gupta, Y. (SRI International, Menlo Park, CA (USA)). Feb 1983. 150p. NTIS, PC A07/MF A01. Order Number DE83901826.

Portions are illegible in microfiche products.

Fourteen experiments were performed with one-eleventh scale of turbine hub sectors impacting reinforced-concrete wall sections of reactor-containment buildings. The scale-model tests provided the penetration depths and backface scabbing thresholds, and set a lower bound on the perforation thresholds. Comparison of the scale-model results with predictions of NDRC design formulae showed that these formulae adequately predicted the frontface penetration depths, but underpredicted missile-impact velocities to produce backface scabbing by factors of 2 to 3. Finite-difference computations of a missile impact predicted the fracture location in the target that led to cratering and showed the importance of missile interactions with the reinforcing grids. The overall conclusions of the work are that scale-model tests can be used effectively to examine the response of reinforced-concrete targets to various turbine-missile impact conditions and that concrete walls are substantially more resistant to failure by turbine-missile impact than predicted by current design formulae.

23612 **(EPRI-NP—2856-CCM) NATBWR: a steady-state model for natural circulation in boiling-water reactors.** Healzer, J.M.; Abdollahian, D. (Levy (S.), Inc., Campbell, CA (USA)). Feb 1983. 148p. NTIS, PC A07/MF A01. Order Number DE83901828.

Portions are illegible in microfiche products.

This report documents the NATBWR steady-state BWR natural-circulation model and activities under EPRI Project RP1561-1 to gather data and predict the natural-circulation operation of the BWR. The report is organized into two parts, with the first part describing the NATBWR model and applications of the model to available BWR natural-circulation data and the second part providing user and programming information about the model. Five different operating BWR's were selected to demonstrate the application of the NATBWR model, one of each type from BWR/1 through BWR/4. For each operating plant, the available natural circulation data has been compared to model predictions. In addition to the data predictions, the behavior of the BWR system at reduced inventory, where the system is isolated and scrammed, and cooling provided by natural circulation has been analyzed. Finally, included as an appendix to Part 1 of this report is a discussion of the stability of the BWR system at natural-circulation conditions.

23613 **(EPRI-NP—2873) Organization and structure of an EPRI DATATRAN data bank.** Cordes, G.A.; Mortensen, G.A. (Intermountain Technologies, Inc., Idaho Falls, ID (USA)). Feb 1983. 55p. NTIS, PC A04/MF A01. Order Number DE83901834.

An EPRI data bank containing experimental data from pump performance, critical flow, and fuel behavior tests has been constructed using the DATATRAN data base management and executive system. The organization of the data bank and the structure of the data in the data bases are presented along with a description of the DATATRAN module used to sort the data.

23614 **(EPRI-NP—2898) Windfield and trajectory models for tornado-propelled objects. Final report.** Redmann, G.H.; Radbill, J.R.; Marte, J.E.; Dergarabedian, P.; Fendell, F.E. (Golder Associates, Inc., Bellevue, WA (USA)). Mar 1983. 360p. NTIS, PC A16/MF A01. Order Number DE83901859.

Portions are illegible in microfiche products.

This is the final report of a three-phased research project to develop a six-degree-of-freedom mathematical model to predict the trajectories of tornado-propelled objects. The model is based on the meteorological, aerodynamic, and dynamic processes that govern the trajectories of missiles in a tornadic windfield. The aerodynamic coefficients for the postulated missiles were obtained from full-scale wind tunnel tests on a 12-inch pipe and car and from drop tests. Rocket sled tests were run whereby the 12-inch pipe and car were injected into a worst-case tornado windfield in order to verify the trajectory model. To simplify and facilitate the use of the trajectory model for design applications without having to run the computer program, this report gives the trajectory data for NRC-postulated missiles in tables based on given variables of initial conditions of injection and tornado windfield. Complete descriptions of the tornado windfield and trajectory models are presented. The trajectory model computer program is also included for those desiring to perform trajectory or sensitivity analyses beyond those included in the report or for those wishing to examine other missiles and use other variables.

23615 **(EPRI-NP—2907-SR) Joint TMI-2 information and examination program: EPRI participation and support, 1982 progress and 1983 program plan.** (Electric Power Research Inst., Palo Alto, CA (USA). Nuclear Power Div.). Feb 1983. 95p. NTIS, PC A05/MF A01. Order Number DE83901866.

This special report describes EPRI's role in the GEND Program of support for recovery of TMI-2 from the March 28, 1979, accident. Results to date of EPRI-funded projects on decontamination and dose reduction technology; fuel/fission product transport and deposition; mechanical component survival; and primary system pressure boundary characterization are presented. Plans for 1983 are described. Finally, estimate of the program's value to the nuclear industry is given.

23616 **(GEND—031) Submerged demineralize system processing of TMI-2 accident waste water.** Sanchez, H.F.; Quinn, G.J. (EG and G Idaho, Inc., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 65p. NTIS, PC A04/MF A01. Order Number DE83009223.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Accident-generated radioactive waste at Three Mile Island Unit 2 includes a varity of high and low specific-activity waste. The high-specific-activity waste, particularly over one million gallons of contaminated water, required special processing and secondary waste handling. General public utilities and its contractors developed a zeolite-based ion-exchange system called the Submerged Demineralizer System to reduce contamination levels in the water to below allowable limits. Testing and modifications resulted in an operating system that had successfully processed waste water from the Reactor Coolant Bleed Tanks, the Reactor Building Basement, and the Reactor Coolant System as of August 1982. System design objectives were met and decontamination criteria established in 10 CFR 20 were attained. Additional wastes that could not be handled routinely were generated by another water-processing system, called EPICOR II. EPICOR II wastes are discussed. Low-specific-activity (LSA) wastes such as trash and resin-bed waste canisters are also included in handling. LSA wastes are routinely handled and shipped according to existing industry practice. Plant records are summarized to provide approximate yearly volumes and curie loadings of low-specific-activity wastes being shipped off the Island to a commercial burial site.

23617 (HEDL-SA—2854) Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5. Hilliard, R.K. (Hanford Engineering Development Lab., Richland, WA (USA)). 1983. Contract AC06-76FF02170. 39p. (CONF-830221—1). NTIS, PC A03/MF A01. Order Number DE83008971.

From ACRS meeting on fast reactors; Washington, DC, USA (4 Feb 1983).

Portions are illegible in microfiche products.

The objective of the program is to obtain sufficient analytical and experimental data to provide a basis for judging the adequacy of existing aerosol behavior computer codes that describe inherent attenuation processes. The test facilities and test results are presented for Test AB5.

23618 (KFK—3250) Nuclear safety project. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)). Jun 1982. 601p. (In German). NTIS (US Sales Only), PC A99/MF A01. Order Number DE83750130.

The Annual Report 1981 is a detailed description (in German language) of work within the Nuclear Safety Project performed in 1981 in the nuclear safety field by KfK institutes and departments and by external institutes on behalf of KfK. It includes for each individual research activity short summaries in English language on - work completed - results obtained - plans for future work. This report was compiled by the project management.

23619 (KFK—3331) Thermal and mechanical behaviour of PWR fuel rod simulators for LOCA-experiments. Casal, V.; Malang, S.; Rust, K. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorbauelemente; Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Nukleare Sicherheit). May 1982. 36p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750145.

Performance of the out-of-pile test program REBEKA (reactor typical bundle experiments Karlsruhe) called for prior development of a fuel rod simulator (FRS) whose thermal and mechanical behaviour corresponds largely to that of a nuclear fuel rod during the low-pressure phase of a loss-of-coolant accident (LOCA). To meet this requirement fuel rod simulators with 10.75 mm outer diameter were developed, fabricated, and used in a variety of single rod and several bundle tests. For new experiments scheduled to provide information about the behaviour of fuel subassemblies having fuel rods with 9.5 mm o.d. quasi-REBEKA FRS's are needed. The thermal and mechanical behaviour of such simulators and of some variants was examined by calculation and compared to that of a fuel rod. Besides the low-pressure phase, the thermal behaviour of some rod types was investigated also at nominal power and in the blowdown phase. FRS's were designed which simulate almost perfectly fuel rods with respect to the temperatures and deformation of the claddings during low-pressure phase of a LOCA. Some of these FRS's are even suitable for blowdown experiments, if the simulators are operated with a modified decay heat curve.

23620 (KFK—3354) Experimental investigation of the unsteady one-phase flow through perforated plates. Casadei, F. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik; Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Maschinenbau). Jul 1982. 337p. (In German). (EUR—7058d). NTIS (US Sales Only), PC A15/MF A01. Order Number DE83750133.

Thesis.

The flow of the coolant through the perforated dip-plate during a hypothetical core-disruptive accident in a sodium-cooled fast breeder reactor was simulated in a one-dimensional model. Several experiments with water as fluid and with various perforation ratios of the dip-plate and different initial heights of the fluid head over the dip plate were run. The pressure drop through the dip-plate and the forces acting on the dip-plate and on the upper plug of the reactor vessel in a wide range of the Reynolds and Strouhal numbers were measured. The flow pattern downstreams the perforated plate was filmed with high-speed cameras. The resistance coefficients for the unsteady flow of the coolant through the perforated plate were obtained as a function of the acceleration. The forces acting on the upper plug and their time integral were compared with those acting on the dip-plate. Finally, using the high-speed film pictures the formation of fluid jets downstream the dip-plate was investigated.

23621 (NUREG—0422-Suppl.6) Safety-evaluation report related to operation of McGuire Nuclear Station, Units 1 and 2. Docket Nos. 50-369 and 50-370. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Feb 1983. 90p. NTIS, PC A05/MF A01 - GPO $5.50. Order Number DE83901688.

This report supplements the Safety Evaluation Report Related to the Operation of McGuire Nuclear Station, Units 1 and 2 (SER (NUREG-0422)) issued in March 1978 by the Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission with respect to the application filed by Duke Power Company, as applicant and owner, for licenses to operate the McGuire Nuclear Station, Units 1 and 2 (Docket Nos. 50-369 and 50-370). The facility is located in Mecklenburg County, North Carolina, about 17 mi north-northwest of Charlotte, North Carolina. This supplement provides information related to issuance of a full-power license for Unit 2 and the staff's evaluation of the licensee's compliance with requirements and conditions contained in the Unit 1 operating license. Subject to favorable resolution of the items discussed in this report, the staff concludes that the station can be operated by the licensee without endangering the health and safety of the public.

23622 (NUREG—0797-Suppl.3) Safety Evaluation Report related to the operation of Comanche Peak Steam Electric Station, Units 1 and 2. Docket Nos. 50-445 and 50-446. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Mar 1983. 64p. NTIS, PC A04/MF A01 - GPO $5.00. Order Number DE83901525.

Supplement No. 3 to the Safety Evaluation Report (SER) related to the operation of the Comanche Peak Steam electric Station, Units 1 and 2, has been prepared by the Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission. the facility is located in Somervell County, Texas. Subject to favorable resolution of the items identified in this supplement, the staff concludes that the facility can be operated by the applicatn without endangering the health and safety of the public. This document provides the NRC staff's evaluation of the outstanding and confirmatory issues that have been resolved since Supplement No. 2 was issued in January 1982, and addresses changes to the SER and its earlier supplements which have resulted from the receipt of additonal information from the applicant during the period of January throught October 1982.

23623 **(NUREG—0896) Safety evaluation report: related to the operation of Seabrook Station, Units 1 and 2, Docket Nos. 50-443 and 50-444, Public Service Company of New Hampshire, et al.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Mar 1983. 625p. NTIS, PC A99/MF A01 - GPO $14.00. Order Number DE83901398.

Portions are illegible in microfiche products.

The Safety Evaluation Report for the application filed by the Public Service Company of New Hampshire, et al., for licenses to operate Seabrook Station, Units 1 and 2 (Docket Nos. STN 50-443 and STN 50-444), has been prepared by the Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission. The facility is located in Seabrook, New Hampshire. Subject to favorable resolution of the items discussed in this report, the staff concludes that the facility can be operated by the applicant without endangering the health and safety of the public.

23624 **(NUREG—0966) Safety-Evaluation Report related to the D2/D3 steam-generator design modification.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Mar 1983. 147p. NTIS, PC A07/MF A01 - GPO $6.50. Order Number DE83901824.

This Safety Evaluation Report (SER) related to the D2/D3 steam generator design modification has been prepared by the Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission. The purpose of this SER is to issue the staff's evaluation of the acceptability of the design modification for both installation and full-power operation in the D2/D3 steam generators based on the Design Review Panel Report of January 1983.

23625 **(NUREG—0968-Vol.1) Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Mar 1983. 941p. NTIS, PC A99/MF A01 - GPO $15.00. Order Number DE83901819.

Portions are illegible in microfiche products.

The Safety-Evaluation Report for the application by the United States Department of Energy, Tennessee Valley Authority, and the Project Management Corporation, as applicants and owners, for a license to construct the Clinch River Breeder Reactor Plant (docket No. 50-537) has been prepared by the Office of Nuclear Reactor Regulation of the United States Nuclear Regulatory Commission. The facility will be located on the Clinch River approximately 12 miles southwest of downtown Oak Ridge and 25 miles west of Knoxville, Tennessee. Subject to resolution of the items discussed in this report, the staff concludes that the construction permit requested by the applicants should be issued.

23626 **(NUREG—0968-Vol.2-App.) Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Mar 1983. 373p. NTIS, PC A16/MF A01 - GPO $9.50. Order Number DE83901820.

Portions are illegible in microfiche products.

The purpose of this appendix is to describe the staff's evaluation of hypothetical core disruptive accidents which, for analytical purposes, have been postulated to occur in the CRBR. This introduction is divided into three major parts. The first background information. The second provides an overview of potential CDA initiating events and consequences considered for the CRBR. The third describes the guidelines used in evaluating CDAs for the CRBR. A schematic view of major components of the reactor systems is provided. The staff's evaluation of the major areas associated with the assessment of CDAs is presented.

23627 **(NUREG/CR—1391) MAEROS user manual.** Gelbard, F. (Sandia National Labs., Albuquerque, NM (USA)). Dec 1982. Contract AC04-76DP00789. 58p. (SAND—80-0822). NTIS, PC A04/MF A01. Order Number DE83008378.

This manual discusses the capabilities and implementation procedures for MAEROS, the stand-alone multicomponent aerosol module of CONTAIN. The module calculates aerosol composition and mass concentration as a function of particle size and time. The processes that may be incorporated are: (1) coagulation due to Brownian motion, gravity and turbulence; (2) particle deposition due to gravitational settling, diffusion and thermophoresis; (3) particle growth due to condensation of a gas, typically water vapor; and (4) time varying sources of particles of different sizes and chemical compositions. The capabilities of the code are illustrated through simulating an aerosol released in a hypothetical situation.

23628 **(NUREG/CR—2531-Rev.1) Introductory user's manual for the US Nuclear Regulatory Commission Reactor Safety Research Data Bank.** Scofield, N.R.; Hardy, H.A.; Laats, E.T. (EG and G Idaho, Inc., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 91p. (EGG—2164-Rev.1). NTIS MF A01. Order Number DE83008733.

Microfiche only, copy does not permit paper copy reproduction.

The United States Nuclear Regulatory Commission (NRC) has established the NRC/Division of Accident Evaluation (DAE) Data Bank Program to collect, store, and make available data from the many domestic and foreign water safety research programs. Local direction of the program is provided by E G and G Idaho, Inc., prime contractor for the Department of Energy (DOE) at the Idaho National Engineering Laboratory (INEL). The NRC/DAE Data Bank Program provides a central computer storage mechanism and access software for data that is to be used by code development and assessment groups in meeting the code and correlation needs of the nuclear industry. The administrative portion of the program provides data entry, documentation, training, and advisory services to users and the NRC. The NRC/DAE Data Bank and the capabilities of the data access software are described.

23629 **(NUREG/CR—2728) Interim Reliability Evaluation Program procedures guide.** Carlson, D.D.; Gallup, D.R.; Kolaczkowski, A.M.; Kolb, G.J.; Stack, D.W.; Lofgren, E.; Horton, W.H.; Lobner, P.R. (Sandia National Labs., Albuquerque, NM (USA); Science Applications, Inc., McLean, VA (USA); Science Applications, Inc., La Jolla, CA (USA)). Jan 1983. Contract AC04-76DP00789. 151p. (SAND—82-1100). NTIS, PC A08/MF A01 - GPO. Order Number DE83008731.

This document presents procedures for conducting analyses of a scope similar to those performed in Phase II of the Interim Reliability Evaluation Program (IREP). It documents the current state of the art in performing the plant systems analysis portion of a probabilistic risk assessment. Insights gained into managing such an analysis are discussed. Step-by-step procedures and methodological guidance constitute the major portion of the document. While not to be viewed as a cookbook, the procedures set forth the principal steps in performing an IREP analysis. Guidance for resolving the problems encountered in previous analyses is offered. Numerous examples and representative products from previous analyses clarify the discussion.

23630 **(NUREG/CR—2744/1) Human-reliability data bank for nuclear power plant operations. Volume 1. A review of existing human-reliability data banks.** Topmiller, D.A.; Eckel, J.S.; Kozinsky, E.J. (General Physics Corp., Columbia, MD (USA)). Dec 1982. Contract AC04-76DP00789. 221p. (SAND—82-7057/1). NTIS, PC A10/MF A01. Order Number DE83008765.

Portions are illegible in microfiche products.

To assess adequately the impact of human performance on nuclear power plant reliability using probabilistic risk assessment (PRA) techniques, the US Nuclear Regulatory Commission determined that a human reliability data bank should be developed. Sandia National Laboratories contracted with General Physics Corporation to (1) determine the applicability of existing human reliability data banks to nuclear power plant PRAs, and (2) develop a concept for a human reliability data bank and a program for its implementation. The results of the first task are given in Volume 1 of NUREG/CR-2744, while Volume 2 of the same NUREG contains the results of the data bank concept development task. This report describes a survey and comparative analysis of previous and current attempts to quantify and predict human operator and maintainer performance as a function of design, training, procedural, or situa-

tional factors. An assessment was made of these methods and techniques as to their potential applicability to PRA and as a supplement to the data and procedures in NUREG/CR-1278. Five previously established human reliability data banks were reviewed along with five current systems, all of which inlcude estimates of human error related events. The data banks were evaluated against a set of criteria intended to serve as guidelines for an idealized human reliability data reporting, storage, and retrieval system. It was concluded that insufficient data currently exist in these systems to adequately support nuclear PRA activities, and it was therefore recommended that a human reliability data bank specific to nuclear power plant PRA applications be developed. The appendices to Volume 1 reproduce the previously established data banks in their entirety and selected tables from currently existing data banks.

23631 **(NUREG/CR—2771) Common-cause fault rates for instrumentation and control assemblies.** Atwood, C.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 177p. (EGG-EA—5623). NTIS, PC A09/MF A01 - GPO $7.00 . Order Number DE83008766.

Estimates of common cause fault rate and related quantities, based on Licensee Event Reports of instrumentation and control assemblies in nuclear reactors are presented. The Licensee Event Report data base is briefly described, and imperfections in the data are discussed. The components are grouped into assemblies, for which rates are estimated. For estimating rates, the binomial failure rate model is used, extended to allow for the substantial observed plant-to-plant variability, and for shocks that by their nature cause all the assemblies in a system to fail. Every quantity is estimated by both a point estimate and a 90% interval. All rates are expressed per calendar hour.

23632 **(NUREG/CR—2887) RELAP5 assessment: FLECHT SEASET steam-generator test 23402.** Kmetyk, L.N. (Sandia National Labs., Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. 62p. (SAND—82-2894). NTIS, PC A04/MF A01 - GPO. Order Number DE83009369.

Portions are illegible in microfiche products.

The RELAP5 independent assessment project at Sandia National Laboratories is part of an overall effort funded by the NRC to determine the ability of various systems codes to predict the detailed thermal/hydraulic response of LWR's during accident and off-normal conditions. The RELAP5 code is being assessed at SNLA against test data from various integral and separate effects test facilities. As part of this assessment matrix, a steam generator transient performed at the FLECHT SEASET test facility has been analyzed. The results show that RELAP5 calculates the correct overall heat-transfer rate during most of the steam-generator test, but that the details of the response are not reproduced; the code predicts equilibrium and homogeneous behavior while the experimental results exhibit several nonequilibrium and nonhomogeneous effects.

23633 **(NUREG/CR—2901) CRAC calculations for accident sections of environmental statements.** Johnson, J.D.; Ritchie, L.T. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 62p. (SAND—82-1693). NTIS, PC A04/MF A01 - GPO. Order Number DE83009337.

Portions are illegible in microfiche products.

The CRAC2 computer code was adapted to the calculation requirements of Draft/Final Environmental Impact Statement (DES/FES) casework analysis for the Nuclear Regulatory Commission. CRAC is a revised version of the CRAC (Calculation of Reactor Accident Consequences) computer code developed in support of the Reactor Safety Study, WASH-1400. A graphical output package was developed for displaying CRAC2 computed results. All phases of the casework analysis calculations from initial data formatting to plotting of calculated results are executed through the use of procedure files on the Idaho National Engineering Laboratory (INEL) computing system at Idaho Falls, Idaho. The INEL computing system operates under the Control Data Corporation (CDC) NOS/BE Operating System (Level 518) and Intercom Version 5.

23634 **(NUREG/CR—3074) Application of reduction methods to nuclear power plant structures.** Miller, C.A.; Philippacopoulos, A.J. (Brookhaven National Lab., Upton, NY (USA)). Oct 1982. Contract AC02-76CH00016. 96p. (BNL-NUREG—51623). NTIS, PC A05/MF A01 - GPO. Order Number DE83008734.

Portions are illegible in microfiche products.

Guyan Reduction is used extensively to reduce the degrees of freedom of a structural model prior to performing dynamic analysis. Prior studies have shown that large errors in member loads may result when Guyan Reduction is used. This conclusion was based upon a study of structures which are smaller and of somewhat different types than are usually encountered in the structural analysis of nuclear power plant facilities. The objective of the study is to extend the prior results to structures more typical of nuclear power plants. Two structures are considered and large errors in member loads are again found when reduction methods are used.

23635 **(NUREG/CR—3167) Heat transfer to water from a vertical tube bundle under natural-circulation conditions.** Gruszczynski, M.J.; Viskanta, R. (Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering). Jan 1983. Contract W-31-109-ENG-38. 57p. (ANL—83-7). NTIS, PC A04/MF A01 - GPO. Order Number DE83008459.

The natural circulation heat transfer data for longitudinal flow of water outside a vertical rod bundle are needed for developing correlations which can be used in best estimate computer codes to model thermal-hydraulic behavior of nuclear reactor cores under accident or shutdown conditions. The heat transfer coefficient between the fuel rod surface and the coolant is the key parameter required to predict the fuel temperature. Because of the absence of the required heat transfer coefficient data base under natural circulation conditions, experiments have been performed in a natural circulation loop. A seven-tube bundle having a pitch-to-diameter ratio of 1.25 was used as a test heat exchanger. A circulating flow was established in the loop, because of buoyancy differences between its two vertical legs. Steady-state and transient heat transfer measurements have been made over as wide a range of thermal conditions as possible with the system. Steady state heat transfer data were correlated in terms of relevant dimensionless parameters. Empirical correlations for the average Nusselt number, in terms of Reynolds number, Rayleigh number and the ratio of Grashof to Reynolds number are given.

23636 **(NUREG/CR—3212) Selected review and evaluation of US safety research vis-a-vis foreign safety research for nuclear power plants.** Stevenson, J.D.; Thomas, F.A. (Stevenson and Associates, Cleveland, OH (USA)). Mar 1983. 148p. NTIS, PC A07/MF A01 - GPO $6.50. Order Number DE83901848.

Portions are illegible in microfiche products.

A review of currently available nuclear-safety research resources in a selected group of United States government national laboratories is presented. The current nuclear-safety research interests of industry organizations, particularly the Electric Power Research Institute, are also identified. In addition, suggestions for potential joint or cooperative funding of light-water-reactor safety research in the US between the NRC and other organizations, both foreign and domestic, are presented. The topics of research considered are associated with the areas of Siting, Structural Engineering, Metallurgy, Materials, and Mechanical Engineering.

23637 **(ORAU/IEA—83-2(M)) Towards intrinsically safe light-water reactors.** Hannerz, K. (Oak Ridge Associated Universities, Inc., TN (USA)). Feb 1983. Contract AC05-76OR00033. 88p. NTIS, PC A05/MF A01. Order Number DE83008191.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The reactor-safety issue is one of the principal problems threatening the future of the nuclear option, at least in participatory democracies. It has contributed to widespread public distrust and is the direct cause of the escalation in design complexity and quality assurance requirements that are rapidly eroding the competitive advantage of nuclear power. Redesign of the light-water reactor can eliminate those features that leave it open to public distrust and ob-

structive intervention. This redesign appears feasible within the realm of proven technology in those fields (fuels, materials, water chemistry, waste technology, etc.) in which extended operating experience is essential for confidence in system performance. A pressurized water reactor outline design developed to achieve the above goal is presented. The key feature is the design of the primary system extracting heat from the core so that the latter is protected from damage caused by any credible system failure or any destructive intervention from the outside by either violent means (up to and including nonnuclear warfare) or by mistaken or malicious use of the plant control systems. Such a design objective can be achieved by placing the entire primary circulation system in a large pressurized pool of cold water with a high boric acid content. Enough water is provided in the pool to allow core-decay-heat removal by evaporation for at least one week following any incident with no cooling systems operating. Subsequently it is assumed that a supply of further water (a few cubic meters per hour) from the outside can be arranged, even without the presence of the plant operating personnel.

23638 **(UCID—19473) Preliminary investigation of interconnected systems interactions for the safety injection system of Indian Point-3.** Alesso, H.P.; Lappa, D.A.; Smith, C.F.; Sacks, I.J. (Lawrence Livermore National Lab., CA (USA)). 4 Mar 1983. Contract W-7405-ENG-48. 54p. NTIS, PC A04/MF A01. Order Number DE83009172.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The rich diversity of ideas and techniques for analyzing interconnected systems interaction has presented the NRC with the problem of identifying methods appropriate for their own review and audit. This report presents the findings of a preliminary study using the Digraph Matrix Analysis method to evaluate interconnected systems interactions for the safety injection system of Indian Point-3. The analysis effort in this study was subjected to NRC constraints regarding the use of Boolean logic, the construction of simplified plant representations or maps, and the development of heuristic measures as specified by the NRC. The map and heuristic measures were found to be an unsuccessful approach. However, from the effort to model and analyze the Indian Point-3 safety injection system, including Boolean logic in the model, singleton and doubleton cut-sets were identified. It is recommended that efforts excluding Boolean logic and utilizing the NRC heuristic measures not be pursed further and that the Digraph Matrix approach (or other comparable risk assessment technique) with Boolean logic included to conduct the audit of the Indian Point-3 systems interaction study.

23639 **Automatic diagnosis of multiple alarms for reactor control rooms.** Gimmy, K.L.; Nomm, E. (E. I. du Pont de Nemours & Company, Savannah River Laboratory, Aiken, SC 29808). *Transactions of the American Nuclear Society;* **41**: 520(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23640 **Three-dimensional modeling of thermal and fluid mixing in PWRs during high-pressure coolant injection.** Lyczkowski, R.W.; Domanus, H.M.; Hull, J.R.; Miao, C.C.; Schmitt, R.C.; Sha, W.T. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 261-263(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23641 **Modeling of crackling of sodium-concrete reactions.** Marchertas, A.H.; Pan, Y.C. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 362-364(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23642 **ALICE-11: an arbitary lagrangian-eulerian code for containment analysis with complex internals.** Wana, C.Y.; Zeuch, W.R. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 364-366(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23643 **Fluid-cushioned impact between reactor fuel assemblies for seismic disturbances.** Ash, J.E. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 366-367(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23644 **Core restraint analysis of a free-flowering large heterogeneous LMFBR.** Ash, J.E.; McLennan, G.A. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 369-370(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23645 **New aspects in the analysis of fuel dynamics during loss-of-flow transients.** Tentner A.M.; Wider, H.U. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 374-375(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23646 **An assessment of SIMMER-11 freezing, melting, and plugging calculations.** Bott, T.F.; Smith, R.C. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **41**: 376-377(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23647 **The effects of flowing fuel particulate on bulk freezing predictions.** Sienicki, J.J.; Spencer, B.W. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 377-378(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23648 **Relative freezing controlled penetration potential of carbide and oxide fuel.** Sienicki, J.J.; Spencer, B.W. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 379-380(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23649 **Preliminary results of the first four TRAN fuel freezing experiments.** McArthur, D.A.; Hayden, N.K. (Sandia National Laboratories, Albuquerque, NM 87185). *Transactions of the American Nuclear Society;* **41**: 381-382(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23650 **Role of fuel power in HCDA early fuel dispersal.** Bauer, T.H.; Simms, S. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 382(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23651 **Boundary effects on Zircaloy-4 cladding deformation in LOCA simulation tests.** Longest, A.W.; Chapman, R.H.; Crowley, J.L. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 383-385(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23652 **Analysis of the BCL transient ECC bypass test with the TRAC-PD2/MOD1 code.** Slovic, G.; Saha, P. (Brookhaven National Laboratory, Upton, NY 11973). *Transactions of the American Nuclear Society;* **41**: 386-387(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23653 **Analysis of a partial scram event in a typical BWR/4.** Lu, M.S.; Cerbone, R.J.; Levine, M.M.; Shier, W.G. (Brookhaven National Laboratory, Upton, NY 11973). *Transactions of the American Nuclear Society;* **41**: 394-396(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23654 **A model for predicting containment response to hydrogen burns.** Camp, A.L.; Sherman, M.P.; Wester, M.J. (Sandia National Laboratories, Albuquerque, NM 87185). *Transactions of the American Nuclear Society;* **41**: 398-399(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23655 **Hydrogen combustion during degraded core accidents in PWR ice condenser plants.** Yang, J.W.; Pratt, W.T. (Brookhaven National Laboratory, Upton, NY 11973). *Transactions of the American Nuclear Society;* **41**: 399-400(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23656 **Two-phase jet load models.** Weigand, G.G.; Thompson, S.L.; Tomasko, D. (Sandia National Laboratories, Albuquerque, NM 87185). *Transactions of the American Nuclear Society;* **41**: 404(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23657 **An improved quasistatic method for transition-phase calculations.** Luck, L.B. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **41**: 317-318(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

23658 **Application of a honeycomb insulator design in a variable high-temperature, high-pressure environment.** Larson, T.K.; Cozzuol, J.M.; Zabriskie, J.M. (EG and G, Idaho Falls, Idaho, USA). *Heat Transfer Engineering;* **3**: No. 2, 31-48(Oct-Dec 1981).

Structural heat transfer problems (heat addition and loss) encountered in small-scale experimental facilities used in the nuclear safety research industry are reviewed. The design and construction of an evacuated honeycomb canister insulator and its thermal performance during steady state and transient reactor safety related experiments are discussed. 9 refs.

25 ENERGY STORAGE

2501 Magnetic

REFER ALSO TO CITATION(S) 24116, 24129, 25030

2502 Compressed Gas

REFER ALSO TO CITATION(S) 23666

23659 **(PNL—4460) Review of environmental studies and issues on compressed-air energy storage.** (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 95p. NTIS, PC A05/MF A01. Order Number DE83009114.

This report is a summary of the environmental and regulatory issues associated with Compressed Air Energy Storage (CAES) technology. It reviews from an environmental perspective the progress and results of extensive engineering research and technology development directed at commercial development of CAES technology. A comprehensive analysis of the legal and regulatory issues associated with CAES is also summarized. Significant conclusions are: the environmental impacts associated with construction and operation of CAES facilities are generally similar to or less severe than those associated with construction of conventional electrical generating facilities; adverse subsurface and surface environmental impacts can be largely avoided by thorough geological characterization of subsurface conditions, careful evaluation of surface environmental factors, and avoidance of unsuitable sites; the US has a large number of suitable sites; siting flexibility for CAES facilities is much greater than for other energy storage technologies; land use requirements are generally significantly less than for conventional generating facilities of similar genrating capacity; petroleum fuel use is much less than for conventional peak power generating facilities; CAES technology offers the potential for increased efficiency of utilization of utility system generating capacity which results in reduced overall resources commitment and reduced environmental impacts; and, due to lack of implementation experience, uncertainty still surrounds the legal and regulatory issues associated with CAES.

23660 **(PNL—4639) Thermodynamic analysis of five compressed-air energy-storage cycles.** Fort, J.A. (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 50p. NTIS, PC A03/MF A01. Order Number DE83009470.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

One important aspect of the Compressed-Air Energy-Storage (CAES) Program is the evaluation of alternative CAES plant designs. The thermodynamic performance of the various configurations is particularly critical to the successful demonstration of CAES as an economically feasible energy-storage option. A computer code, the Compressed-Air Energy-Storage Cycle-Analysis Program (CAESCAP), was developed in 1982 at the Pacific Northwest Laboratory. This code was designed specifically to calculate overall thermodynamic performance of proposed CAES-system configurations. The results of applying this code to the analysis of five CAES plant designs are presented in this report. The designs analyzed were: conventional CAES; adiabatic CAES; hybrid CAES; pressurized fluidized-bed CAES; and direct coupled steam-CAES. Inputs to the code were based on published reports describing each plant cycle. For each cycle analyzed, CAESCAP calculated the thermodynamic station conditions and individual-component efficiencies, as well as overall cycle-performance-parameter values. These data were then used to diagram the availability and energy flow for each of the five cycles. The resulting diagrams graphically illustrate the overall thermodynamic performance inherent in each plant configuration, and enable a more accurate and complete understanding of each design.

2504 Capacitor Banks

23661 **(AD-A—121029/3) Repetitive switching for inductive energy storage. Final technical report Apr 81-Jun 82.** Barber, J.P.; Trzaska, T.J. (IAP Research, Inc., Dayton, OH (USA)). Aug 1982. 47p. NTIS, PC A03/MF A01.

This report describes the development and testing of a high current repetitive switch. The objective was to develop a switch capable of repetitively diverting current and energy from an inductive energy store into a load. A mechanical switch employing sliding electrical contacts was built and tested. The switch demonstrated performance exceeding design goals. In an inductive energy storage circuit the switch successfully commutated a current of 7640 A at a repetition rate of 33 Hz. The switch has been operated at repetition rates ranging from 1 Hz to 49 Hz. Over 1600 successful commutations have been achieved with no failures.

2505 Flywheels

23662 **(DOE/ET/20279—157) Advanced flywheel-storage system.** Jarvinen, P.O. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). 1981. Contract AC02-76ET20279. 7p. (CONF-810833—10). NTIS, PC A02/MF A01. Order Number DE82000664.

From Mechanical, magnetic, and underground energy storage 1981 annual contractors' review meeting; Washington, DC, USA (24 Aug 1981).

Portions are illegible in microfiche products.

This paper reports on an efficiency measurements program conducted on a 1/10-scale prototype flywheel energy-storage unit employing magnetic bearings; on the design of an improved configuration for a full-scale, 20-kWh residential flywheel unit; and on an in-progress effort to test a GFE advanced composite rotor on magnetic suspension.

2506 Thermal

REFER ALSO TO CITATION(S) 23358, 23426, 23667, 23702

23663 **(ANL/NESC—841) SOLTES1; thermal energy systems simulation.** Fewell, M.E. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048841.

Reference report, SAND-78-1315 (Revised).

SOLTES1 simulates the steady-state response of thermal energy systems to time-varying data such as weather and loads. Thermal energy system models of individual components and simple and complex systems can be modularly constructed from a library of routines. These routines mathematically model solar collectors, pumps, switches, thermal energy storage, thermal boilers, auxiliary boilers, heat exchangers, extraction turbines, extraction turbine/generators, condensers, regenerative heaters, air conditioners, process vapor, etc. SOLTES1 also allows user-supplied routines. A preprocessor aids the user in constructing and editing system models and automatically constructs a SOLTES1 program using only those routines in the system model. Because of its modularity and flexibility, SOLTES1 can be used to simulate a wide variety of thermal energy systems such as solar power/total energy, fossil-fired power plants/total energy, nuclear-fired power plants/total energy, solar energy heating and cooling, geothermal energy, and solar hot water.CDC6600,7600; FORTRAN IV (99%) and COMPASS (1%); NOS/BE 1.3, SCOPE 2.1, SCOPE 3.3/NOS1.2 and SCOPE 3.4/INTERCOM4.5; Usually SOLTES1 central memory requirements are between 70K and 150K (octal) words. 150 words/component in the system model of Extended Core Storage (ECS) are needed, along with 4 to 6 disk and/or tape units. PRESOL, the SOLTES1 preprocessor program, requires approximately 52K (octal) words of central memory to load under NOS/BE 1.3 on the CDC6600. SOLTES1 requires approximately 115K (octal) words to execute sample problem 1 and 142K (octal) words for sample problem 2. Approximately 10K (octal) words of ECS are required for data storage for sample problem 2 on the CDC6600. On the CDC7600 under SCOPE 2.1, PRESOL requires approximately 20K (octal) words to load, and approximately 106K and 134K (octal) words to execute sample problem 1 and 2, respectively.

23664 **(ANL/SPG—22) Assessment of cool storage in commercial building applications.** Asbury, J.G.; Giese, R.F.; Calm, J.M. (Argonne National Lab., IL (USA)). Nov 1982. Contract W-31-109-ENG-38. 39p. NTIS, PC A03/MF A01. Order Number DE83008727.

Cool storage can be used for electrical load leveling in commercial building applications. Analysis of conventional chilled-water and ice-storage systems indicates that payback periods, relative to nonstorage systems, of less than four years are available under the partial-storage, or load-leveling, mode of operations. Storage systems with sufficient capacity to eliminate completely on-peak operation of the refrigeration systems entail larger initial capital outlays and longer paybacks under existing commercial-class electric rate schedules. Better storage performance and lower costs could be achieved through improved matching of the storage and the refrigeration systems and through improved latent-heat storage systems.

23665 **(PB—83-133744) Optimization of heat storage systems using silica gels. Final report.** Bougard, J.; Delire, C.; Jadot, R. (Commission of the European Communities, Luxembourg). [nd]. 123p. (EUR—7697-EN). NTIS, PC E06/MF E06.

A mathematical model simulating the behavior of a packed-bed of silica gel has been developed and used in this study. Silica gel heat storage systems deliver hot air which is drier than required for domestic purposes. Three systems have been studied to provide possible solutions. Results have shown that solution is the most promising. The physico-chemical properties of some silica gels have been determined and the factors affecting these properties are outlined. The application of the system to a dwelling house in Belgium is studied.

23666 **(PNL—4390) Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems.** Zaloudek, F.R.; Wheeler, K.R.; Marksberry, L. (Flui-Dyne Engineering Corp., Minneapolis, MN (USA); Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 106p. NTIS, PC A06/MF A01. Order Number DE83009062.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Advanced Compressed-Air Energy Storage (ACAS) plants have the near-term potential to reduce the fuel consumption of compressed-air plants from 33 to 100%, depending upon their design. Fuel is saved by storing some or all of the heat of compression as sensible heat which is subsequently used to reheat the compressed air prior to expansion in the turbine generator. The thermal storage media required for this application must be low cost and durable. The objective of this project was to screen thermal store materials based on their thermal cycle durability, particulate formation and corrosion resistant characteristics. The materials investigated were iron oxide pellets, Denstone pebbles, cast-iron balls, and Dresser basalt rock. The study specifically addressed the problems of particle formation and thermal ratcheting of the materials during thermal cycling and the chemical attack on the materials by the high temperature and moist environment in an ACAS heat storage bed. The results indicate that from the durability standpoint Denstone, cast iron containing 27% or more chromium, and crushed Dresser basalt would possibly stand up to ACAS conditions. If costs are considered in addition to durability and performance, the crushed Dresser basalt would probably be the most desirable heat storage material for adiabatic and hybrid ACAS plants, and more in-depth longer term thermal cycling and materials testing of Dresser basalt is recommended. Also recommended is the redesign and costing analysis of both the hybrid and adiabatic ACAS facilities based upon the use of Dresser basalt as the thermal store material.

2508 Chemical

23667 (BNL—32591) Energy storage via the carbothermic reduction of sodium oxide. England, C.; Mezzina, A.; Salzano, F.; Skaperdas, G.; Strickland, G. (Brookhaven National Lab., Upton, NY (USA)). Dec 1982. Contract AC02-76CH00016. 17p. (CONF-821213—4). NTIS, PC A02/MF A01. Order Number DE83008585.

From 5. international conference on alternative energy source; Miami Beach, FL, USA (13 Dec 1982).

Work is described which explores the idea of supplementing/combining the energy contained in coal with that derived from high-temperature heat sources such as nuclear or solar. Consideration is given to carrying out an endothermic chemical reaction; namely Na_2O + C (coal) → 2Na + CO thus, producing two storable products, i.e., sodium and carbon monoxide. Subsequently, sodium can be reoxidized to Na_2O to yield heat or, in an electrochemical device, to produce electricity, while CO is a useful fuel as well as an important chemical commodity. The background of this technology is reviewed, applicable process systems are described in terms of simple heat and material balances, and some experimental results are given. The practical feasibility of such a system is assessed and problem areas are identified.

2509 Batteries

REFER ALSO TO CITATION(S) 23408, 23884, 23885

23668 (AD-A—120853/7) Studies leading to the development of high-rate lithium-sulfuryl chloride battery technology. Quarterly report No. 3, 1 Apr-30 Jun 82. Hall, J.C.; Koch, M. (Gould, Inc., Rolling Meadows, IL (USA). Materials Lab.). Oct 1982. 50p. NTIS, PC A03/MF A01.

The overall aim of the program is an examination of the viability of an active electrolyte lithium-sulfuryl chloride battery system. The specific objectives are: Quantify the stability of lithium in sulfuryl-chloride based electrolyte. Develop means to stabilize in the lithium anode in sulfuryl chloride based electrolyte to meet Army storage requirements. Establish the performance limits of Li/SO_2Cl_2 cells with respect to cathode and electrolyte composition.

23669 (AD-A—122283/5) Effect of electrolyte water content on the anodic passivation of lithium in 1m lic104-propylene carbonate. James, S.D.; Nagao, A.R. (Naval Surface Weapons Center, Silver Spring, MD (USA)). Jun 1982. 23p. NTIS, PC A02/MF A01.

This work deals with the effect of aqueous contamination on the anode passivation of Li in 1M $LiC10^4$-propylene carbonate. Passivation occurs more readily with increasing electrolyte water content. Preliminary evidence suggests that anodic passivation may be due to anodic enrichment and eventual precipitation of $LiC10^4$ in the superficial anolyte layer.

23670 (BMFT-FB-T—79-142) Development of a lead tetrafluoroborate accumulator. Beck, F. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 212p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750337.

Portions are illegible in microfiche products.

The lead tetrafluoroborate accumulator works according to the principle of the dissolved state accumulator. As material for the base electrodes, natural graphite filled polypropylene 80/20 (CPP) is used. The main problems with this system are connected with the electrochemical behaviour of the lead dioxide electrode. As a problem in addition, the formation of graphite oxide (intercalation of BF^-_4-ions) was established. However, it was possible to gain over 400 cycles with full charge and deep discharge (Qsub(disch.) = 2 - 3 Ah/dm²). After about 20 cycles, the system was fully restored (residual discharge). Positive CPP-electrodes, on which layers of PbO_2 (0,2 mm thickness) were predeposited, yielded up to now 70 cycles without loss of capacity with Ah-yields and active mass utilization in excess to 90%. Free convection is satisfactory, if the separation of dense electrolyte layers is neutralized by periodical forced convection. The new developed 'sieve bottom cell' is very useful for this purpose. Via a scale up with 1-2 mm thick CPP-bipolar electrodes, energy densities of more than 40 Wh/kg, with concentrated solutions (in connection with positive electrodes with PbO_2-layers) energy densities of more than 60 Wh/kg are attainable. It is possible to apply the reversible formation of graphite oxide with CPP-electrodes in 5 M HBF_4 for a copper-graphite oxide accumulator. Uptil now, more than 600 cycles with Qsub(disch.) = 0,15 Ah/dm² were attained. The cell voltage is 1,2 V.

23671 (BMFT-FB-T—80-115) Bipolar lead accumulator cell with high energy density. Kiessling, R. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 109p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750362.

Portions are illegible in microfiche products.

A cell design using bipolar electrodes was chosen to increase the energy density of the known system $PbO_2/H_2SO_4/Pb$. Weight reductions have been established by improving several details of the battery construction, the grid design and by reducing the amount of electrolyte. Requirements for low maintenance by reducing water consumption have been equally fulfilled. Lead-plated copper was chosen for the grid of the negative electrode, lead-plated aluminium for the grid of the positive electrode. A 80 to 100 μm layer of lead offers a sufficient protection to the copper grid because anodic corrosion of the negative electrode can be excluded. Copper itself, in contact with negative active material and within the range of the usual electrochemical potential remains stable. Aluminium as a positive grid requires a protecting lead layer of 250 μm or more without any pinholes or other defects as anodic corrosion may be intense. The negative and positive components of the bipolar electrodes are connected centrally by riveting and soft soldering. An insulating foil separates the electrolyte compartments. Devices for gas escape as well as for water refilling have provided for. The actual energy density of the test cells has attained 44.2 Wh_s/kg.

23672 (CONF-820814—42) Performance of a 10-cell LiAl/metal sulfide battery. Miller, W.E.; Gay, E.C.; Kilsdonk, D. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008665.

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

Portions are illegible in microfiche products.

A 4kWh LiAl/FeS battery having a molten salt electrolyte was fabricated by Eagle-Picher Industries under contract to ANL and was tested through 150 deep discharge cycles at ANL. The battery module contained ten series connected cells having theoretical capacities of 394 Ah. When fully charged, the battery gave 340 Ah at a 70-A discharge for a cell specific energy of 90 Wh/kg. Battery discharge was terminated when the weakest cell reached a 0.9-V cutoff and was terminated on bulk charge when the strongest cell reached a 1.55-V cutoff. The battery was fully charged through equalization after about every 8 cycles. Between charge equalizations, the battery capacity loss rate was about 0.75% of the fully charged capacity per cycle. Normal capacity fade rate for individual cells is 0.02 to 0.03% per cycle. The higher loss rate for the battery resulted from capacity and coulombic efficiency differences among the cells. During the last third of battery life three cells developed internal short circuits by a common failure mode.

23673 (CONF-820907—4) Development of unique lightweight high-performance lead-acid batteries. Pierson, J.R.; Weinlein, C.E. (Johnson Controls, Inc., Milwaukee, WI (USA). Globe Battery Div.). 1982. Contract W-31-109-ENG-38. 25p. NTIS, PC A02/MF A01. Order Number DE83008604.

From 13. international power sources symposium; Brighton, UK (27 Sep 1982).

Portions are illegible in microfiche products.

Application of improved materials, optimized component design and a novel electrolyte circulation system has resulted in lead-acid batteries with enhanced performance-to-weight ratios. Selective use of these design features has allowed battery design engineers to stretch the capability of the lead-acid system to meet new challenges for light-weight high-power density starting batteries for gasoline and diesel engines and for high performance, long lived batteries for electric vehicle propulsion.

23674 **(CONF-821015—6) Electrode characterization of Li-Al/FeS cells.** Redey, L.; Vissers, D.R.; Newman, J.; Higuchi, S. (Argonne National Lab., IL (USA); Lawrence Berkeley Lab., CA (USA); Government Industrial Research Lab., Osaka (Japan)). 1982. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83008642.

From Electrochemical Society fall meeting; Detroit, MI, USA (17 Oct 1982).

Portions are illegible in microfiche products.

A specially designed, compact, prismatic bicell has been developed to investigate the voltage losses and the voltage-loss processes that occur within the electrodes and the separator of the Li-Al/FeS cells as a function of electrode loading and thickness, and to obtain fundamental current-potential data on the various cell elements needed for current-collector optimization. The electrode plate area is 6.5 cm x 8.69 cm (53.44 cm^2). Voltage taps (V+ and V-) attached to the current-collector plates ensure true, almost IR-drop-free potential readings of the respective electrodes. The current-collectors consist of heavy, 0.18-cm-thick sheets of nickel, chosen to minimize the ohmic potential drop in the plates and ensure a uniform current distribution across the face of the electrode plaques. The FeS electrode is constructed of two electrode plaques separated by a center nickel sheet current collector, while each Li-Al electrode consists of a single electrode plaque attached to a similar current collector plate. Two reference elecrodes (2) (R_1 and R_3) permit measurement of the electrode polarization and local temperatures. Results are presented.

23675 **(CONF-821015—7) Current-pulse measurements of Li-Al/FeS cells.** Redey, L.; Vissers, D.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 2p. NTIS, PC A02/MF A01. Order Number DE83008690.

From Electrochemical Society fall meeting; Detroit, MI, USA (17 Oct 1982).

Portions are illegible in microfiche products.

The power characteristics of a specially designed high-temperature Li-Al/FeS cell are described, and the voltage-loss characteristics of the individual electrodes at current densities of 0.04 to 1.7 A/cm^2 are given. (WHK)

23676 **(CONF-821015—9) Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program.** Miller, J.F.; Rajan, J.B.; Hornstra, F.; Christianson, C.C.; Yao, N.P. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83008691.

From Electrochemical Society fall meeting; Detroit, MI, USA (17 Oct 1982).

The significant progress achieved in each of the three battery systems since the initiation of this battery development program is described. The 1982 demonstrated accomplishments are verified test results obtained on multicell modules (typically three to six cells each) at NBTL through May 1982. In particular, significant technical progress has been made in extending battery life. Additional progress in cell development and battery subsystem design (chargers, watering systems, electrolyte management systems) has allowed the construction of full-size battery packs. Globe Battery Division (lead-acid), Westinghouse (nickel/iron), and Eagle-Picher (nickel/iron) delivered full-size batteries to the Jet Propulsion Laboratory (JPL) for in-vehicle testing and evaluation.

23677 **(CONF-821106—29) Applications of the DC-relaxation technique in Li-Al/FeS cell development.** Redey, L.; Vissers, D.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83008532.

From Annual meeting of heat transfer and energy conversion (American Inst of Chemical Engineers); Los Angeles, CA, USA (14 Nov 1982).

Portions are illegible in microfiche products.

A current-interruption, cell-voltage/electrode-potential relaxation technique has been applied successfully to obtain information about operational characteristics of electrodes and how they are affected by such factors as the electrode or electrolyte composition, electrode structure, and cell design. The technique permits measurement of the electrode potentials and their relaxations after current interruption. The instrumentation system developed for this work has a long-term system stability of 1 mV and a capability of resolving 1 mV. The application of a special reference electrode calibration technique allows the reliability of the measured potential values to be better than 1 mV at any time within the duration of the cell tests (1 year or longer). An important feature of the system is its ability to develop detailed relaxation curves across six to seven orders of magnitude on the time scale.

23678 **(CONF-821211—6) Current status of the lithium/metal sulfide system.** Steunenberg, R.K. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008621.

From 5. DOE battery and electrochemical contractors' conference; Crystal City, VA, USA (7 Dec 1982).

The design and performance of state-of-the-art lithium/metal sulfide batteries are reviewed; and electrode materials, electrolytes, and battery separator materials are discussed. (WHK)

23679 **(LBL—15546) Computer control of electrochemical experiments with application to zinc/nickel oxide cells.** Katz, M.H.; McLarnon, F.R.; Cairns, E.J. (Lawrence Berkeley Lab., CA (USA)). Dec 1982. Contract AC03-76SF00098. 453p. NTIS, PC A20/MF A01. Order Number DE83009132.

Portions are illegible in microfiche products; Thesis.

A computer-controlled test system has been designed and constructed to allow the simultaneous and continuous cycling of 16 or more electro-chemical cells. The system offers resolution and stability within 0.025% of full-scale, and response times are typically 1 ms. A wide variety of charge and discharge regimes, including pulsed charge and power discharge profiles, are implemented through various computer algorithms. The software configuration allows two programs to execute concurrently in the computer memory and to communicate with each other through a set of codified messages. This arrangement permits flexible interaction with all experiments and provides on-line data reduction and display. The test system has been employed to investigate the effects of constant-current and various pulsed-current charging modes on the cycle life and capacity retention of Zn/NiOOH cells cycled at 100% depth-of-discharge. Test results included cell voltages, potentials of the NiOOH and Zn electrodes versus Hg/HgO reference electrodes, coulombs, watt-hours average voltages, and associated efficiencies. Post-mortem tests included Zn electrode x-ray studies. A 30ms-ON/90ms-OFF pulse profile, with a 15mA/cm^2 peak current density, improved the operating conditions of the cells by minimizing the overpotentials on the Zn and NiOOH electrodes. In contrast to all other charge profiles tested, it eliminated cell shorting (for at least 100 cycles) and slowed the loss of ZnO reserve, thereby preventing rapid cell capacity decline.

23680 **(PB—83-101667) Foreign technology alert bibliography: batteries and components. Final report Jun 80-May 82.** Wilkinson, G. (Infocom, Crawley (UK)). [nd]. 25p. NTIS, PC A$25.00/MF $25.00.

The objective of the study was to provide a systematically organized collection of abstracts relating to batteries and conponents from countries outside the USA from documents within the NTIS collection. A tailored search of the NTIS bibliographic data base was performed and the output carefully edited and indexed. Much of the technology originates from Western Europe, particularly France and West Germany, and a proportion of this material is in its original language. The contents include: industry development; battery technology (electrode and cell design, electrochemistry); primary batteries; secondary batteries (lead-acid, nickel/cadmium, sodium/sulfur, other); fuel cells; solar cells; applications (electric vehicles, signal transmitters, space and military); and related devices. Each section is cross-referenced and the book contains useful author and subject indexes.

23681 **(PB—83-135897) Advanced electrochemical energy storage devices. Final report 1 Jan 78-31 Mar 80.** Tofield, B.C. (Commission of the European Communities, Luxembourg). [nd]. 275p. (EUR—7595-EN-VOL-2). NTIS, PC E11/MF E11.

The aim was to develop and characterise materials for next-generation advanced, rechargeable batteries for vehicular transport and stationary energy-storage applications, and to identify battery materials and cell types most promising for further development.

23682 **(SAND—82-0695) Characteristics and development report for the MC3573 thermal battery.** Street, H.K. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 45p. NTIS, PC A03/MF A01. Order Number DE83009220.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report describes the design intent, product characteristics, and development history of the MC3573 high-current, electrically activated thermal battery. This battery is required to operate five to six times longer than the usual weapon system power battery. The MC3573 employs the Li(Si)/LiCl.KCl/FeS_2 electrochemical system. The battery is a right-circular cylinder with attached mounting brackets. It measures 122.1 mm in length, 88.9 mm in diameter, and stands 96.2 mm high. The battery is the power supply for the W81 and W85 JTA telemetry systems.

23683 **Method for uniformly distributing carbon flakes in a positive electrode, the electrode made thereby and compositions.** Battles, J.E.; Mrazek, F.C.; Smaga, J.A. (to Dept. of Energy). US Patent 4,367,159. 4 Jan 1983. Filed date 19 Jan 1981. vp.

PAT-APPL-206234.

A positive electrode for a secondary electrochemical cell wherein an electrically conductive current collector is in electrical contact with a particulate mixture of gray cast iron and an alkali metal sulfide and an electrolyte including alkali metal halides or alkaline earth metal halides. Also present may be a transition metal sulfide and graphite flakes from the conversion of gray cast iron to iron sulfide. Also disclosed is a method of distributing carbon flakes in a cell wherein there is formed an electrochemical cell of a positive electrode structure of the type described and a suitable electrolyte and a second electrode containing a material capable of alloying with alkali metal ions. The cell is connected to a source of electrical potential to electrochemically convert gray cast iron to an iron sulfide and uniformly to distribute carbon flakes formerly in the gray cast iron throughout the positive electrode while forming an alkali metal alloy in the negative electrode. Also disclosed are compositions useful in preparing positive electrodes.

23684 **Lead deficiency and hydrogen content in battery electrode beta-PbO_2.** Jorgensen, J.D.; Varma, R.; Rotella, F.J.; Cook, G.; Yao, N.P. (Argonne Natl Lab, IL, USA). *Journal of the Electrochemical Society;* **129**: No. 8, 1678-1681(Aug 1982).

Neutron powder diffraction data have been collected for beta-PbO_2 obtained from lead-acid battery plates cycled in H_2SO_4 and D_2SO_4. A comparison of total scattering cross sections for the hydrogenated samples vs. the deuterated sample indicates a bulk hydrogen concentration of 0.21 H atoms per PbO_2 unit. Rietveld refinements of the data yield the expected tetragonal beta-PbO_2 structure, $P4_2mnm$, with a 3-5% vacancy concentration on the lead sites. These results suggest that at least part of the hydrogen is incorporated into the beta-PbO_2 crystalline lattice. 21 refs.

29 ENERGY PLANNING AND POLICY

REFER ALSO TO CITATION(S) 25225, 25227, 25285

2901 Energy Analysis And Modeling

REFER ALSO TO CITATION(S) 23007, 23013, 23031, 23037, 23423, 23719, 23841

23685 **(CONF-810203—18) Disaggregation, input-output analysis, and energy impacts.** Wolsky, A.M.; Shen, S. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007792.

From AIME annual meeting; Chicago, IL, USA (22 Feb 1981).

Published Input-Output Analysis is a coarse description of inter-industry transactions that is sometimes out of date. The analyst who must estimate the effect of changed technology or changed prices with fixed technology on energy and materials flows can make increased use of published analysis if he can increase its resolution and update its assumptions. The results described here provide a basis for doing this that does not require a computer in practical applications.

23686 **(CONF-8103162—1) Midwest region energy outlook.** (Argonne National Lab., IL (USA)). Mar 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83008526.

From Midwest region energy conference; Dearborn, MI, USA (17 Mar 1981).

An energy profile of the Midwest region is presented. This profile provides a point of departure for evaluating Midwest energy demand and energy supply projections. Finally, the Midwest potential for nonconventional energy resources and technologies is analyzed. (ACR)

23687 **(DOE/EI/10696—1-Vol.1) Documentation of International Energy Evaluation System. Volume 1. Overview.** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). Sep 1981. Contract AC01-80EI10696. 51p. NTIS, PC A04/MF A01. Order Number DE83008711.

Portions are illegible in microfiche products.

Methodology, capabilities, and uses are emphasized rather than implementation details. The model structure and major modeling assumptions intrinsic to the system that dictate the most suitable applications are discussed. Analysis scenarios, limitations and alternative modeling approaches are also presented. (PSB)

23688 **(DOE/EI/10696—1-Vol.2) Documentation of International Energy Evaluation System. Volume 2.** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). Sep 1981. Contract AC01-80EI10696. 191p. NTIS, PC A09/MF A01. Order Number DE83008701.

Portions are illegible in microfiche products.

The models, programs, and solution process that constitute Phase III are presented. Formulation of the problem, which is a problem of optimal resource allocation into a linear programming problem, the steps in obtaining an equilibrium solution, the theory behind the solution procedure, and the support programs for preparing output reports are described. A detailed discussion of the sector models that make up the integrating model and the demand forecasting models is provided. An appendix describes the conventions used in naming the variables of rows, columns and entries of the IEES model data tables and LP matrix.

23689 **(DOE/EI/10696—1-Vol.3-Pt.2) Documentation of International Energy-Evaluation System.** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). Sep 1981. Contract AC01-80EI10696. 248p. NTIS, PC A11/MF A01. Order Number DE83008654.

Portions are illegible in microfiche products.

The IEES supply model generates supply curves for each fuel, producing region, and forecast year. Three primary fossil fuels are considered: crude oil, coal (steam, metallurgical, and lignite), and natural gas. There are 29 non-US. IEES regions in the supply model, but not every fuel is produced in each region. For each fuel and region, the model is provided with data on prices (1975 US dollars), maximum production capacity, price elasticity of supply, and price increments. Estimation of these data, is a complex process that requires the use of many sources, and it is exogeneous to the IEES supply model. The methodology, used in developing the supply functions is similar for all resources, but any resource-specific features are indicated. The final output is discussed in detail with reference to the supply LP matrix generated by the supply model software.

23690 (DOE/EIA—0202(82/2Q)-2) Short-term energy outlook. Volume 2. Methodology. (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). May 1982. 109p. NTIS, PC A06/MF A01. Order Number DE83008069.

This volume updates models and forecasting methodologies used and presents information on new developments since November 1981. Chapter discusses the changes in forecasting methodology for motor gasoline demand, electricity sales, coking coal, and other petroleum products. Coefficient estimates, summary statistics, and data sources for many of the short-term energy models are provided. Chapter 3 evaluates previous short-term forecasts for the macroeconomic variables, total energy, petroleum supply and demand, coal consumption, natural gas, and electricity fuel shares. Chapter 4 reviews the relationship of total US energy consumption to economic activity between 1960 and 1981.

23691 (DOE/EIA—0249(83/1)) Directory of Energy Data Collection Forms. (USDOE Energy Information Administration, Washington, DC. Office of Statistical Standards). Mar 1983. 35p. NTIS, PC A03/MF A01. Order Number DE83008818.

An authoritative listing of the public use statistical forms currently used as basic energy information gathering tools by the Department of Energy (DOE) is presented. All DOE forms used to collect statistical information with Office of Management and Budget (OMB) approval active as of January 1, 1983, are in this directory. Although OMB approval is not currently active for three annual forms, EIA-176, EIA-627, and EIA-767, it is planned that they will continue and so they are also included. Excluded are forms used for administrative purposes or to apply for benefits unless the data collected are also used to satisfy the Energy Information Administration's (EIA) statistical needs. Each form listed in this directory contains a description or abstract of the form as well as certain frequently requested items of information. Included are the energy source(s) and function(s) covered by the form, the types of respondents, the legislative mandate authorizing the data collection, the publications resulting directly from the data collection, and the names of complementary data systems.

23692 (DOE/NBM—3007739) Argonne Energy Model - Portugal. Wyant, F.R.; Macal, C.M. (Argonne National Lab., IL (USA)). 4 Apr 1981. Contract W-31-109-ENG-38. 81p. NTIS MF A01. Order Number DE83007739.

Microfiche only, copy does not permit paper copy reproduction.

The Argonne Energy Models (AEMS) for Portugal and Korea were constructed to analyze the economic impacts of various conditions and policies that could alter the energy-sector outlook in Portugal and Korea. Some preliminary conclusions from this energy-modeling exercise for Portugal are presented. Individual sections provide a brief description of the model methodology; a discussion of key data inputs to the model; an analysis of reference case results, a comparison of other economic growth, energy price, and government policy cases; and a summary.

23693 (NP—3901669) Pacific Northwest regional energy planning module III: policy options and programs. Development of standards and program packages. Volume I. Summary. Final report, Phase 2. McCarthy, P.M.; Barnes, H.H.; Londner, H.D.; Edmondson, S.E.; Friedlander, S.C. (Applied Management Sciences, Inc., Silver Spring, MD (USA)). 17 Sep 1982. 63p. NTIS, PC A04/MF A01. Order Number DE83901669.

Principal findings identify a spectrum of program strategies; recommend program strategies for consideration by the Council as candidates for inclusion in the Regional Plan's energy conservation program; and identify model conservation standards for consideration by the Council. Standards are considered for: new and existing buildings; utility, customer and government conservation programs; and other consumer actions for achieving conservation.

23694 (NP—3901672) Development and application of the NPPC commercial-energy-demand model. Jackson, J.; Lann, R. (Jackson (Jerry) and Associates, Marietta, GA (USA)). 1 Nov 1982. 194p. NTIS, PC A09/MF A01. Order Number DE83901672.

Portions are illegible in microfiche products.

The extended model structure and parameter development are described and the results of a number of model validation exercises and example forecasts are reported. Chapters 2 and 3 provide general background information on model structure and application issues. Chapter 9 summarizes characteristics of three example model forecasts. Other chapters present detailed model structure and applications issues.

23695 Role of allocation functions in energy modeling. Smith, V.K. (Univ. of North Carolina, Chapel Hill); Hill, L.J. *Resources and Energy;* 4: No. 4, 307-328(Dec 1982). Contract W-7405-ENG-26.

In the recent past, there has been a proliferation of technical models developed to describe the relationships between and to forecast the levels of energy-related magnitudes. Although the models vary widely in their structural features and objectives, they share at least one common attribute: an energy-allocation problem. That is, the models predict an aggregate level of energy usage (often by type). Policy decisions require this prediction be made at a disaggregate level, either with respect to components of the equilibrium quantity supplied. By distinguishing the various problems of disaggregation, this paper evaluates four methodological approaches that are commonly utilized in representing the energy-allocation problem in the production sector of energy models. These approaches are evaluated in the context of the neoclassical theory of production with special emphasis given to the problems posed by aggregation over both inputs and micro-units and the effects of the formulation of short-run versus long-run dynamics. 47 references.

2902 Economics And Sociology

REFER ALSO TO CITATION(S) 23004, 23005, 23006, 23017, 23018, 23033, 23034, 23036, 23064, 23065, 23066, 23687, 23692, 23708, 23723, 24219, 24303

23696 (CONF-810574—3) Modeling industrial-boiler retirement economics. Baker, J.E.; Grogan, P.J.; Hanson, D.A.; Streets, D.G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008513.

From International Association of Science and Technology for Development energy symposium; San Francisco, CA, USA (20 May 1981).

Portions are illegible in microfiche products.

An important assumption in forecasting the future industrial-boiler fuel mix is the rate at which existing boilers are retired. Retirement methodologies based on a fixed percentage of fuel demand may overestimate the capacity actually retired and therefore overestimate the number of new boilers subject to the new source performance standards (NSPS). A study was conducted to analyze the technical and economic factors involved in boiler retirement and fuel-switching decisions. The objectives were to demonstrate the effect of fuel-conversion economics on the boiler-retirement decision, and to discuss the implications of these effects for boiler-retirement modeling. The focus of the study was motivated by boiler failure or physical wear and fuel conversion economics. It was found that when adequately maintained, industrial boilers deteriorate very slowly, and boiler life can be prolonged over extensive periods of time, if not indefinitely. A simple cost comparison between oil and coal neglects a number of real barriers to industrial coal use: environmental, institutional, and site-specific. There is also value to the firm in postponing retirement decisions, hoping to take advantage of technology and cost improvements and better information on fuel availability and environmental regulations. These intangibles can be combined into a cost differential premium that must be overcome to induce industrial boiler owners to switch to coal. The base case analysis looks at an 87 x 10^6 Btu/hr boiler operating at 55% capacity utilization rate; with a real, aftertax discount rate of 8%, an inflation rate equal to 10%, and an investment tax credit of 10%. With coal at \$2/10^6 Btu, the breakeven oil price for conversion is \$6/10^6 Btu or \$38/bbl. Therefore, a switch to coal may not be economically justified even in the base case (premium = 0%).

23697 **(CONF-820422—4) Overview of boom towns and construction efficiency interactions.** Santini, D.J. (Argonne National Lab., IL (USA)). Apr 1982. Contract W-31-109-ENG-38. 23p. NTIS, PC A02/MF A01. Order Number DE83007806.

From American Society of Civil Engineers conference; Las Vegas, NV, USA (26 Apr 1982).

Portions are illegible in microfiche products.

Productivity loss in construction projects where boom town conditions exist was shown to be quantifiable. Proper identification of this effect could result in savings of billions of dollars to the US energy industry by improving cost esimation and subsequent project selection. Methods are suggested for identifying such an effect by use of accumulated data and research on boom town locations in the US.

23698 **(CONF-8203121—1) Patterns of change in the business community of energy boomtowns.** Payne, B.A. (Argonne National Lab., IL (USA)). [nd]. Contract W-31-109-ENG-38. 17p. NTIS, PC A02/MF A01. Order Number DE83008662.

From 5. conference on small city and regional communities; Stevens Point, WI, USA (25 Mar 1982).

Community officials and citizens who are facing boomtown growth and decline stages are concerned with planning for the changes and having some control over their future state. Energy-project developers are increasingly interested in working with these communities, knowing that the success of their projects may hinge on community services and cooperation. This paper is an attempt to use a population-ecology approach to generate hypothese on business populations in boomtowns. Hypotheses have been developed on the distribution of businesses by control or ownership, by generalist or specialist form, and by size, and on the distribution of administrative related to production workers across the business population. The population-ecology approach to the study of boomtowns has two heuristic characteristics. First, it provides new insights into the processes the boom communities will experience. Second, the boomtown situation provides a unique opportunity to observe organizations in a rapidly changing and usually isolated environment.

23699 **(DOE/EIA—0349/1) Energy company development patterns in the postembargo era. An overview of financial performance, 1974-1980. Volume 1: analysis of trends.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Oct 1982. 142p. NTIS, PC A07/MF A01. Order Number DE83008952.

Portions are illegible in microfiche products.

The Financial Reporting System (FRS) monitors and evaluates economic performance in the energy industry to promote an understanding and a critical review of the motivations and consequences of corporate investment decisions in the energy area. This report contains a financial overview of developments during the 1974 to 1980 period in the operations of the 26 major US energy companies. The overview is conducted at the corporate level, by major lines of energy business, and by major functions within each line-of-business. This is the first EIA publication to make extensive use of the recently available retrospective data collection based on Form EIA-28 for the 1974 to 1976 period.

2903 Environment, Health, And Safety

REFER ALSO TO CITATION(S) 23427, 23574, 23637, 23659, 23727, 23754, 24233, 24237, 24240, 24255, 24271, 24304, 24305, 24309, 24402

23700 **(CONF-820627—15) Cogeneration and emission offsets in nonattainment areas.** Garvey, D.B.; Grogan, P.J.; Vivian, W.E. (Argonne National Lab., IL (USA); Michigan Univ., Ann Arbor (USA). Inst. of Public Policy Studies). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008503.

From 75. annual meeting on the Air Pollution Control Association; New Orleans, LA, USA (20 Jun 1982).

An examination of the data on emission offsets collected during an extensive investigation between 1978 and 1980 led to identification of ten cases of offsets involving energy conservation technologies - cogeneration, district-heating or community energy systems. Six of the offset cases involved TSP nonattainment, two for SO_2 and two for NO/sub x/. The one permit application denial was a result of the inability of the new source to provide offsets of NO/sub x/. The one permit application that was withdrawn was cancelled for economic reasons not associated with air quality regulations, according to the company. The eight applications either approved, pending or in preparation, all propose offsets from the shutdown (or reduction in load) of boilers of proposed customers of the cogenerated steam. In each case, the new, or expanding source, was in close proximity to the proposed offsets, achieving a net air-quality benefit. The furthest distance between a new source and an offset was ten miles, in the case discussed in Ohio. This distance was an alteration in the original proposal and is not likely to be approved.

23701 **(CONF-820814—43) Role of the breeder in long-term energy economics.** Kosobud, R.F.; Daly, T.A.; Chang, Y.I. (Argonne National Lab., IL (USA); Illinois Univ., Chicago (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008668.

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

Portions are illegible in microfiche products.

Private and public decisions affecting the use of nuclear and other energy technologies over a long-run time horizon were studied using the ETA-MACRO model which provides for economic- and energy-sector interactions. The impact on the use of competing energy technologies of a public decision to apply benefit-cost analysis to the production of carbon dioxide that enters the atmosphere is considered. Assuming the public choice is to impose an appropriate penalty tax on those technologies which generate CO_2 and to allow decentralized private decisions to choose the optimal mix of energy technologies that maximize a nonlinear objective function subject to constraints, the study showed that breeder technology provides a much-larger share of domestically consumed energy. Having the breeder technology available as a substitute permits control of CO_2 without significant reductions in consumption or gross national product growth paths.

2904 Natural Resources

REFER ALSO TO CITATION(S) 23002, 23689, 24267

2905 Research, Development, Demonstration, And Commercialization

REFER ALSO TO CITATION(S) 23750, 23827, 25284

2906 Nuclear Energy

REFER ALSO TO CITATION(S) 23003, 23112, 23163, 23177, 23442, 23574, 23636, 23637, 23701, 24303, 24828, 25282

2907 Transport And Storage

REFER ALSO TO CITATION(S) 23725, 23883

2908 Waste Heat Utilization

REFER ALSO TO CITATION(S) 23856, 23862, 23863, 23872, 24157

23702 **(EPRI-EM—2864) Assessment of European district-heating technology.** Oliker, I. (Burns and Roe, Inc., Oradell, NJ (USA)). Feb 1983. 107p. NTIS, PC A06/MF A01. Order Number DE83901827.

Portions are illegible in microfiche products.

The report assesses European district heating turbine, piping, consumer connection, and thermal energy storage technology from the viewpoint of its application to prospective implementation of district heating systems by electric utility companies in the United

States. Since hot water is generally used as the heat transport medium in Europe, it is the basis for the technology study. Major emphasis is placed on European turbines with condensing tails, prefabricated insulated conduit, consumer connections using three-stage heat exchange, and thermal energy storage.

2910 Conservation

REFER ALSO TO CITATION(S) 23688, 23700, 23809, 23810, 23811, 23812, 23815, 23825, 23827, 23875

23703 **(ANL/CNSV-TM—107) Content of local-energy-management programs.** Kron, N.F. Jr.; Meshenberg, M.J. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 101p. NTIS, PC A06/MF A01. Order Number DE83008637.

The supply/demand energy systems in three focus communities - Richmond, Indiana; Ann Arbor, Michigan; and Portland, Maine - are described, as well as energy data for the US as a whole and the Northeast and North Central regions in particular to show the larger context of the energy situation in which the focus communities operate. For each focus community is documented the use of local resources, methods for systematic evaluation, contents of final energy plans, and implementation process. This information is then examined to identify problems and possible improvements in local program content. (LEW)

23704 **(ANL/CNSV-TM—111) Local-government energy-conservation programs and their impact on rental buildings.** Suchy, K.W.; VonZuckerstein, I. (Argonne National Lab., IL (USA)). Aug 1982. Contract W-31-109-ENG-38. 66p. NTIS, PC A04/MF A01. Order Number DE83008638.

The current programs are identified, with emphasis at the local level, that have been implemented to promote energy efficiency in rental property markets. Various factors that influence the success of these local programs are analyzed. The issues of availability of financing on reasonable terms, efficiency and appropriateness of various tax incentives, value of information dissemination, regulatory considerations, technological barriers, and other beneficial or deterimental factors are extensively discussed. Local energy conservations programs that pertain to rental markets are reviewed for four representative communities: Chicago, Boston, Minneapolis, and San Francisco. Suggestions for future research are also presented.

23705 **(DOE/CS/22804—T6) Innovative financing for energy-efficiency improvements. Phase II report: model documents and financial projections.** Klepper, M. (Lane and Edson, P.C., Washington, DC (USA)). Dec 1982. Contract AC02-81CS22804. 532p. NTIS, PC A23/MF A01. Order Number DE83005693.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The objective of the work reported is to research, develop and implement methods of financing energy efficiency improvements in multifamily, commercial and industrial buildings. The key terms and issues associated with shared savings transactions, lease transactions and developing a utility sponsored energy service company are described. Provided are: an economic model that can be used to evaluate and compare the financial feasibility of investing in shared savings and leasing transactions (the Energy Savings Investment Model); a financial analysis, including the rate of return and net present value, of 44 different hypothetical leasing and shared savings transactions; a comprehensive analysis of 15 different financial variables used in the Energy Saving Investment Model; a carefully developed model Energy Service Agreement with an extensive commentary describing how, when and where the agreement can be used and the rationale behind each provision of the model document; two model Equipment Lease Agreements that can be used for an energy equipment leasing transaction, along with a commentary discussing important tax and legal aspects of the documents; and a description of the legal and financial issues raised during our examination of the feasibility of the utility diversifying its business by establishing an energy service company. The documents presented in this Report have been designed as model agreements that can be easily modified for use in many different types of transactions.

23706 **(DOE/CS/64007—T2) Assessment of state plans for Title III of the National Energy Conservation Policy Act (NECPA).** (Unified Industries, Inc., Springfield, VA (USA)). 1 Oct 1982. Contract AC01-80CS64007. 74p. NTIS, PC A04/MF A01. Order Number DE83008495.

The purpose of the study reported is to assess the quality of the state plans for managing federal funds granted under the Institutional Conservation Program (ICP) to support energy conservation activities in schools, hospitals, local government buildings, and public care institutions, and to estimate the effects of the various state plans on the overall ability of the national ICP to meet its objectives, which are to save energy, reduce budget pressures on local institutions, and to encourage the use of more abundant fuel types. A further goal was to insure that active state involvement in the short-term CIP effort would foster the longer ragne state commitment to this national policy of energy conservation. The state planws and their energy conservation measure formulas are assessed, and their energy conservation measure scenarios are ranked and analyzed. (LEW)

23707 **(DOE/S—0017) Energy conservation and the federal government: research, development, and management.** (USDOE Office of Energy Research, Washington, DC. Energy Research Advisory Board). Jan 1983. 45p. NTIS, PC A03/MF A01. Order Number DE83009063.

Energy conservation is in large part a response to higher market prices, but markets are not able to call forth all the energy conservation actions or R and D that are economically justified. Nor are higher energy prices the only (or always the most influential) motivating force for energy conservation actions. Many energy conservation projects satisfy the Department of Energy's criteria of long-term, high-risk, high-payoff, and generic for Federal funding. In applying these criteria, the Department must consider the unique characteristics of the sector involved. Data on private energy conservation R and D efforts are extremely hard to assemble, but it probably is no more than $1 billion per year and most probably half or less than that - not sufficient funding for many worthwhile projects. The following division of conservation technologies are considered: industry, buildings, automotive/truck, multi-sector, agriculture. For each of these sectors the Board recommends Federal support in several areas. Personnel shifts and losses, low and shifting funding levels, and lack of planning have had a disastrous effect on the Department of Energy's ability to conduct an effective energy conservation R and D program. The Federal Government should undertake R and D directed at reducing its own energy consumption. The Department of Energy should direct the non-defense R and D; the Department of Defense should direct military R and D from a separate high level office within Defense. The Federal Government has a poor record of energy management for its own use. Management should be shifted from the Department of Energy to the Office of Management and Budget, where data collection and incentive programs should be developed and monitored. Capital budgets for energy conservation should be separate line items in agency budgets.

23708 **(HRP—0904431/4) Cost containment in hospitals through energy conservation (case histories of energy conservation based on a national survey of selected hospitals).** (Bureau of Health Facilities Financing, Compliance and Conversion, Hyattsville, MD (USA)). 1982. 35p. NTIS, PC A03/MF A01.

This report records the results of energy conservation efforts in various medical facilities and is based on a national survey of select hospitals. The survey was designed to present, using a hospital's own words, brief case histories of cost containment through energy conservation. The survey was a means to outline various managerial and technical approaches to save energy in medical facilities. It is hoped that the case histories provide both motivation and guidance for continued and expanded energy conservation programs. The various case histories should prove especially useful to governing boards, administrators, and top managements in medical facilities.

23709 **(NP—3770033) Energy conservation.** Schnell, P.; Dehli, M. (Informationszentrale der Elektrizitaetswirtschaft e.V. (IZE), Bonn (Germany, F.R.)). [nd]. 19p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83770033.

Portions are illegible in microfiche products; Revised version of an article in Energiewirtsch. Tagesfragen, No. 9, 546-552(1979).

Petroleum and natural gas shall be available for our energy supply system only in limited quantities in the future. The focuses of economic energy utilization lie especially in the fields of final energy consumption. It must be expected in the long term that, in-spite of intensive efforts, made with regard to energy conservation, it shall not be possible to increase the specific energetic call fills in power generation, coal beneficiation and petroleum processing. An assessment of all the possibilities of energy conservation shows that conservation rates of ca. 14% of the applied primary energy quantities can be expected in the F.R. of Germany until the year 2000. This shall entail a further reduction of the primary energy consumption.

23710 **(TVA/OP/ECR—82/42) Energy management annual report. Fiscal year 1982.** Steffy, R.C. Jr. (Tennessee Valley Authority, Chattanooga (USA)). 1982. 105p. NTIS, PC A06/MF A01. Order Number DE83901685.

Portions are illegible in microfiche products.

TVA's efforts toward energy conservation are detailed through both its general operations as a utility and through its related energy conservation and management programs, projects, and demonstrations. TVA developed an overall internal energy management plan which established energy performance goals and objectives for TVA operations and buildings. Energy conservation efforts in general operations include programs in the areas of general transportation, industrial operations, utilities operations, and research and development operations and are detailed.

2920 Supply, Demand, And Forecasting

REFER ALSO TO CITATION(S) 23007, 23032, 23035, 23037, 23686, 23690, 23696, 23699, 23728, 23818

23711 **(DOE/EI/10568—T1) Analysis of financial assumptions in selected Energy Information Administration models.** (ICF, Inc., Washington, DC (USA)). Sep 1980. Contract AC01-79EI10568. 121p. NTIS, PC A06/MF A01. Order Number DE83008989.

An overview of the financial assumption incorporated in the major EIA models is presented. In addition to LEAP, these models include the Mid-Term Energy Forecasting System (MEFS) oil- and gas-supply, uranium-supply, coal-supply, and electric-utility models. Theoretical framework relevant to alternative financial treatments of project economics and notes approaches used by EIA in view of this framework was also reviewed. A sensitivity analysis explored the effects of changes in financial assumptions on unit-cost estimates for an illustrative synthetic-fuel project.

23712 **(DOE/EI/10696—1-Vol.3-Pt.1) Documentation of International Energy Evaluation System.** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). Sep 1981. Contract AC01-80EI10696. 202p. NTIS, PC A10/MF A01. Order Number DE83008997.

Portions are illegible in microfiche products.

This volume contains detailed model descriptions for sector submodels in the integrating model (supply, conversion, refinery, and transportation) and for the demand forecasting models (OECD and Non-OECD). The documentation for each is relatively self-contained, that is, a methodology description, data base description, software description, and user's guide is provided for each.

23713 **(DOE/EIA—0202(82/4Q)-2) Short-Term Energy Outlook. Volume 2. Methodology.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Nov 1982. 118p. NTIS, PC A06/MF A01. Order Number DE83008810.

Analytical techniques and assumptions used to prepare the forecasts shown in the November 1982 Outlook, Volume 1 are discussed. Chapters are independent of one another so that specific information can be obtained without reading the entire volume. A brief overview of each chapter is given below: Chapter 2 discusses the changes in forecasting methodology for motor gasoline, distillate and residual fuel oil, other petroleum products, coking coal, electricity generation, and various energy prices. Chapter 3 evaluates the accuracy of previous short-term forecasts of all the major energy sources published in the last 11 issues of the Outlook. Macroeconomic and weather assumptions are included in this evaluation. Chapter 4 analyzes the reasons for the recent price increases in residential electricity and natural gas. Chapter 5 discusses the methodology used to forecast coal exports and analyzes US coal exports from both a historical and an international perspective, and Chapter 6 summarizes the panel discussions at the Short-Term Energy Forecasting Symposium held in October 1982.

23714 **(NP—3770039) International Energy Agency and its growing task.** (Deutsche Presse-Agentur G.m.b.H., Hamburg (Germany, F.R.)). 22 Jan 1981. 86p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83770039.

The role of the International Energy Agency in coping with shortages in mineral oil supply is described. Reasons are given why the agency was founded; the work of the IEA is described.

23715 **(PB—83-125617) Transportation energy contingency planning: transit fuel supplies under decontrol.** (Cabot Consulting Group, Washington, DC (USA)). May 1982. 44p. NTIS, PC A03/MF A01.

This 38-page report discusses the current environment created since the decontrol of petroleum pricing and its impact on transportation energy contingency planning are discussed. Adequate supplies of diesel fuel are essential to transit system efficiency, so with the end of allocation control, the operator must now take an activist role to assure his continued service under an energy crisis. Steps are outlined to help the operator assess the environment they would experience in the event of fuel interruption and understand the impact on the community and themselves. Some options discussed include: diversify suppliers; purchase of diesel fuel on the spot market; establish a centralized emergency fuel purchasing agent; trade in the futures market; and build or expand storage facilities. All options offer benefits, but none are without cost or risk. Failure to plan for future fuel acquisition may even inhibit the system's ability to function.

23716 **Energy projections for the National Energy Policy Plan.** Naill, R.F.; Stanley-Miller, J. (US DOE). *Energy (Stamford, Connecticut);* 7: No. 2, 4-6(Mar 1982).

If the United States continues to import oil at close to today's levels through the mid-1980s, according to present mid-range projections net oil imports would decline gradually beyond 1985 under all but the most pessimistic energy assumptions. While current projections are consistent with recent projections prepared by other Government and private groups, the future is far more uncertain than these or any other projections might indicate. Factors such as the world oil market and the behavior of the economy have proved to be unpredictable, even in the near term. The most one can expect from these projections is an appreciation of potential trends in energy supply and demand patterns, and their sensitivity to key uncertainties. Regardless of projections, it is clear that the United States will remain vulnerable to disruptions in the world oil market for years to come. Emergencies can be foreseen, even if they are not predicted, and there will be a continuing need for preparedness measures to handle them if they should arise. The article includes a graph of world oil prices to the year 2000 according to 10 different scenarios, a tabulation of U.S. energy projected consumption by sectors of the economy and by fuel type, a tabulation of U.S. energy projected production and net imports by source, and a tabulation of U.S. oil outlook for projected domestic production.

2930 Policy, Legislation, And Regulation

REFER ALSO TO CITATION(S) 23035, 23042, 23043, 23078, 23254, 23375, 23693, 23710, 23716, 23722, 23727, 23742, 23812, 23886, 24255, 24304, 24305

23717 (DOE/RL/01830—T9) Development and characterization of electric power conservation and supply resource planning options. Moore, E.B. Jr.; Watts, R.L.; Harrer, B.J.; Hendrickson, P.L. (Battelle Pacific Northwest Labs., Richland, WA (USA)). Aug 1982. Contract AC06-76RL01830. 162p. NTIS, PC A08/MF A01. Order Number DE83008256.

Timing and costs associated with options to acquire electric power conservation and supply resources in the Pacific Northwest are identified. Information is presented on the scheduling of acquisition of electric power conservation resources and electric power supply resources, on key decision points in the acquisition of electric power conservation and supply resources, on the cost of acquiring these resources, on the cost of delaying the acquisition of these resources at key decision points, and on legal and institutional constraints in the acquisition of resources.

23718 (NP—3770029) Activity report 1981/82. (Vereinigung Industrielle Kraftwirtschaft (VIK) e.V., Essen (Germany, F.R.)). 1982. 59p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83770029.

This is an activity report dealing at the same time with a number of important subjects for the power economy in the Federal Republic of Germany. It also contains information on the current state of energy policy as supported by some characteristic data.

23719 (NP—3901670) Pacific Northwest regional energy planning Module III: policy options and programs. Development of standards and program packages. Volume II. Technical report. Final report, Phase 2. McCarthy, P.M.; Barnes, H.H.; Londner, H.D.; Edmondson, S.E.; Friedlander, S.C. (Applied Management Sciences, Inc., Silver Spring, MD (USA)). 17 Sep 1982. 167p. NTIS, PC A08/MF A01. Order Number DE83901670.

Portions are illegible in microfiche products.

This final report to the Pacific Northwest Power Planning and Conservation Council presents implementation strategies and standards for developing energy conservation, renewable resources, and other high-efficiency electric power resources in the residential, commercial, and government sectors of the Pacific Northwest in conformance with the requirements of the Pacific Northwest Electric Power Planning and Conservation Act (Public Law 96-501).

23720 (NP—3901855) Report of the Ad Hoc Committee on utility diversification. Revised draft report. (National Association of Regulatory Utility Commissioners, Washington, DC (USA)). 3 Jun 1982. 287p. Publications Dept., National Association of Regulatory Utility Commissioners, P.O. Box 684, Washington, DC. Order Number DE83901855.

Diversification has been proposed as a partial solution to the financial problems facing the gas, electric power, telephone and water utilities in the US. This draft report examines regulatory policy on utility diversification. it presents the significant issues affecting all utilities and those specific to each class of utility which must be considered by regulators. Potential strategies which can be pursued by state regulators involved with utility diversification are discussed. Information presented to the Committee by individuals and utilities and a bibliography are included in the appendixes. (LCL)

2940 Fossil Fuels

REFER ALSO TO CITATION(S) 22898, 22983, 23001, 23001, 23004, 23005, 23006, 23013, 23013, 23017, 23017, 23018, 23018, 23031, 23031, 23033, 23034, 23035, 23036, 23042, 23043, 23048, 23063, 23064, 23065, 23066, 23072, 23078, 23079, 23080, 23410, 23411, 23412, 23413, 23414, 23716, 23750

23721 (CONF-8210130—Summ.) EIA symposium on short-term energy forecasting. Summary of the proceedings. Baade, P. (comp.). (Department of Energy, Washington, DC (USA). Energy Information Administration). 29 Oct 1982. 92p. NTIS, PC A05/MF A01. Order Number DE83008135.

From EIA symposium on short-term energy forecasting; Arlington, VA, USA (29 Oct 1982).

Portions are illegible in microfiche products.

The papers presented and panel discussions at the October 29, 1982 symposium on short-term energy forecasting are summarized. The three meeting sessions dealt with winter supplies of heating oil, electric power generation, and short-term aspects of oil and gas supply. (LCL)

23722 (DOE/IG—111) Excessive costs incurred by the Strategic Petroleum Reserve program for rental and other services. (Department of Energy, Washington, DC (USA). Office of Inspector General). 19 Jun 1980. 29p. TIC. Order Number DE83006310.

Report to the Secretary, Deputy Secretary.

Audits of procurement costs for goods and services indicated excessive costs to the prime contractor and thus to DOE when competitive bid procedures were not followed. Food services charges to emergency fire fighters were padded. Service calls and transportation also resulted in violation of energy-conservation policy where closer services were available. Recommendations for recovery of excessive costs were implemented where final payment had not occurred.

23723 (DOE/NBB—0027) Energy security in the industrial nations. Folkerts-Landau, E.M.; Salant, S.W.; Schwartz, W.F.; Smith, R.T. (RAND Corp., Santa Monica, CA (USA); Georgetown Univ., Washington, DC (USA). Law Center; Chicago Univ., IL (USA)). Jan 1983. Contract AP01-82PE70410;AP01-82PE70408;AP01-82PE70412. 149p. NTIS, PC A07/MF A01. Order Number DE83009215.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The industrial countries' institutional response to the oil-supply disruptions is assessed in an economic analysis of the International Energy Agency (IEA). This international organization, which was born from the events of 1973, was intended to play a major role in restoring order to the international energy marketplace. It has been ineffective, however, and has moreover advocated policies which, had they been implemented, would have intensified the hardships associated with an energy crisis. An alternative to the IEA is therefore presented. This institutional arrangement accomplishes the goals of international energy security by leaving many intermediate tasks to market mechanisms. In fact, the proposed solution relies on a governmental apparatus only with respect to those desirable achievements that are neglected or ignored in the marketplace. As a result, the alternative program is more efficient, more effective, and more equitable than the arrangement prevailing today.

23724 (GAO/EMD—82-122) Improvements needed in the cash management practices of Interior's simultaneous oil and gas leasing program in Wyoming. (General Accounting Office, Washington, DC (USA). Energy and Minerals Div.). 26 Aug 1982. 4p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760. Order Number DE83901821.

The review objective was to determine if the Wyoming office, in operating its simultaneous oil and gas leasing program, was following good cash management practices and was maintaining adequate controls over filing fee payments. We conducted our review at BLM headquarters in Washington, DC, and at BLM's Wyoming State Office in Cheyenne, Wyoming. We interviewed officials from these offices and observed the processing of filing fee payments. We also examined pertinent cash management requirements set out by the Department of the Treasury's Fiscal Requirements Manual. We obtained BLM officials' oral comments on a draft of this report and incorporated them as appropriate. We identified poor cash management practices that warrant immediate attention. Despite Treasury and Interior Department requirements, the Wyoming office does not promptly deposit filing fee payments it receives from lease applicants, nor does it adequately control and safeguard those payments. As a result, the Government's cash position is adversely affected, and opportunities exist for loss or theft of the payments. During the first three 1982 drawings (in January, March, and May), the Wyoming office collected almost $23 million

in filing fees. Its future collections are expected to be even greater. The fees it collected during the January and March drawings were for the states of Wyoming, Kansas, and Nebraska; those it collected during the May drawing included Colorado and Nevada as well. By the November 1982 drawing, the Wyoming office will collect the filing fees for all states in which the program operates. An Interior study estimated annual filing fee receipts of from $150 million to $225 million a year. Timely deposit of such payments increases the government's cash position, thereby reducing Treasury's need to borrow money and pay the corresponding interest charges.

23725 **(P—400-82-065) Petroleum logistics. Final report and summary.** (Day Energy Management, Plano, TX (USA)). Sep 1982. 161p. California Energy Commission, 1516 Ninth St., Sacramento, CA. Order Number DE83901546.

The results of this analysis of petroleum logistics are presented in this report. The analysis consists of 3 tasks. Task I, an overview of the petroleum supply and tanker industry, places emphasis on oil company decision-making processes; the organization and decision-making of oil companies as related to crude oil acquisition, supply, distribution and tanker management; the movement of oil to California (including potential constraints); and the evolution of the world crude oil market and oil tankers. Task II is an evaluation of critical elements and constraints affecting the petroleum supply and tanker transportation industry. This report discusses the causes of international petroleum logistical stress including supply reduction, interruption or dislocation, demand increase, and tanker shortage. The report further describes constraining factors affecting the supply of petroleum to California under conditions of international petroleum logistical stress, as well as factors which, themselves, can cause constraint to California oil supply during normal conditions. Task III represents a proposed plan for CEC monitoring of the supply and movement of oil to California. Nine critical areas are discussed, as are the major considerations of standby versus continuous monitoring, present and proposed activities, proposed organization for monitoring, and monitoring of the oil industry.

23726 (RAND/N—1709-DOE, pp 115-127) **Performance and maintenance in coal conversion synfuels plants.** Phillips, K.E. (Rand Corp., Santa Monica, CA). Jul 1981. NTIS, PC A07/MF A01. Order Number DE83008161.

From Workshop on industry perspectives on pioneer process plants; Washington, DC, USA (17 Sep 1980).

Portions are illegible in microfiche products.

This presentation outlines a proposed Rand study for examining the feasibility of developing statistical estimating relationships for coal conversion systems in synthetic fuels process plants. This study focuses on the performance and associated maintenance effort required for some of the coal conversion technologies presently under consideration. Recent research shows that plant failures and forced production outages tend to occur with higher-than-expected frequency for technologies that are new at commercial scale. This suggests that target synfuels production levels may prove unrealistic within currently specified budgets and time constraints. More accurate expectations about plant performance can play an important role in formulating policies to establish a viable US synfuels industry while minimizing the likely risks associated with commercializing new technologies.

2950 Hydrogen And Synthetic Fuels

23727 **(DOE/IG—117) Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 2 Jun 1980. 17p. TIC. Order Number DE83006315.

Report to the Secretary, Deputy Secretary.

On November 15, 1979, Senator Baucus requested IG to investigate the alleged suppression. Findings of the investigators were: (1) DOE did not attempt to keep the study results on environmental impacts of synthetic fuels from the public and the Congress; and (2) DOE was not, in fact, in possession of the written-study results at the time the Department responded to Senator Baucus inquiry on western water resources. On October 29, 1979 - nor had they received the report at the time of IG's interim response to Senator Baucus on December 5, 1979. The investigation indicated that there apparently is no uniform understanding among program offices regarding when incomplete studies should be included or cited when responding to Congressional inquiries. Recommendations are that the Executive Secretary establish procedures that will ensure that program offices are aware of the expectations of the Executive Secretary in this regard when the program offices prepare responses to Congressional inquiries.

2960 Electric Power

REFER ALSO TO CITATION(S) 23410, 23411, 23412, 23413, 23414, 23419, 23717, 23719, 23720, 23721

23728 **(CONF-810842—9) Case for electricity: an applications approach.** Asbury, J.G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83007835.

From American Statistical Association meeting; Detroit, MI, USA (10 Aug 1981).

Portions are illegible in microfiche products.

In an attempt to understand the pricing issue, Argonne National Laboratory undertook a two-part study of the residential market for electricity. The first part analyzed statistical data to establish consumer response to differences in electricity and competing-fuel prices. As described in the next section, the basic finding is that the consumer is extremely price-conscious; all available data are consistent with the rational behavior hypothesis. The second part of the study analyzed the total costs of installing and operating alternative after-the meter technologies for electric heating and cooling and compared these costs with oil- and natural gas-based systems. As described in Section III, electricity was found to enjoy a significant cost advantage relative to the competing energy forms, if the local utility can meet its intermediate- and base-load needs with coal and/or nuclear generating plants. Section IV discusses the importance of peak-load pricing to expanding the use of electricity in the building heating market. Although the results presented are specific to the residential market, the basic study approach can be extended to other applications and market sectors.

23729 **(CONF-820203—6) Regional analysis of potential impacts of electric and hybrid vehicles on electric utilities.** Giese, R.F.; Singh, M.K.; Bernard, M.J. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 18p. NTIS, PC A02/MF A01. Order Number DE83008622.

From Society of Automotive Engineers international congress and exposition; Detroit, MI, USA (22 Feb 1982).

Portions are illegible in microfiche products.

This paper analyzes the impact of electric and hybrid vehicle (EHV) charging requirements on electric utilities. The impact for the five EHV scenarios examined generally is small, with total EHV electricity consumption in the HIGH scenarios representing ~ 3% of projected US electricity demand in 2000. However, in several areas, EHV electricity consumption in the HIGH scenarios represents a sizable fraction of electricity demand in 2000 and would have to be included in utility planning. Based on 1979 fuel prices, the total marginal cost of electricity (excluding taxes) for off-peak EHV charging ranges from $0.017/kWh (Federal Regions I and X) to $0.051/kWh (Federal Region II).

23730 **(DOE/EIA—0040(82)) Typical electric bills. January 1, 1982.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Oct 1982. 320p. NTIS, PC A14/MF A01. Order Number DE83008041.

This publication is a continuation of reports published from data reported on the annual Energy Information Administration (EIA) Form 213. These surveys provide comprehensive coverage of the cost to consumers for representative amounts of electricity used per month for residential, commercial, and industrial service in all sections of the nation. Bills for residential electric service are reported for 5 different energy consumption levels in all communities with populations of 2500 or larger. For commercial and industrial service, bills are presented for large cities. Commercial bills are shown for 6 combinations of billing demands in kilowatts (kW) and

monthly consumption levels in kilowatthours (kWh); industrial bills cover 5 billing demands and 10 consumption levels. Present long-term trends and current levels of average electric bills for residential, commercial and industrial service are shown for the total for each state, the District of Columbia, and for the nine Census Regions. Detailed information on bills for the three types of service in the individual communities as of January 1, 1982 are shown in tables.

23731 **(DOE/EIA—0226(81/11)) Electric power monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Nov 1981. 157p. NTIS, PC A08/MF A01. Order Number DE83007663.

Portions are illegible in microfiche products.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US' totals, followed by state data. Chapters on net energy for load, and peak load and net capability present US' totals first, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retain prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23732 **(DOE/EIA—0226(82/02)) Electric power monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Feb 1982. 163p. NTIS, PC A08/MF A01. Order Number DE83008047.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US' totals, followed by state data. Chapters on net energy for load, and peak load and net capability present US' totals first, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retain prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23733 **(DOE/EIA—0226(82/04)) Electric power monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Apr 1982. 157p. NTIS, PC A08/MF A01. Order Number DE83008052.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US' totals, followed by state data. Chapters on net energy for load, and peak load and net capability present US' totals first, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retain prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23734 **(DOE/EIA—0226(82/05)) Electric power monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). May 1982. 155p. NTIS, PC A08/MF A01. Order Number DE83008051.

Portions are illegible in microfiche products.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US' totals, followed by state data. Chapters on net energy for load, and peak load and net capability present US' totals first, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retain prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23735 **(DOE/EIA—0226(82/06)) Electric power monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jun 1982. 166p. NTIS, PC A08/MF A01. Order Number DE83008058.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US' totals, followed by state data. Chapters on net energy for load, and peak load and net capability present US' totals first, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retain prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23736 (DOE/EIA—0226(82/07)) Electric power monthly. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jul 1982. 151p. NTIS, PC A08/MF A01. Order Number DE83008004.

Portions are illegible in microfiche products.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US' totals, followed by state data. Chapters on net energy for load, and peak load and net capability present US' totals first, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retain prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23737 (DOE/EIA—0226(82/10)) Electric power monthly. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Oct 1982. 101p. NTIS, PC A06/MF A01. Order Number DE83008790.

Portions are illegible in microfiche products.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, education institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utitily statistics at the national, regional, state, or local levels on the following subjects: fuel stoks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US totals, followed by state data. Chapters on net energy for load, and peak load and regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retail prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23738 (DOE/EIA—0226(82/11)) Electric power monthly. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Nov 1982. 100p. NTIS, PC A05/MF A01. Order Number DE83008789.

Portions are illegible in microfiche products.

Information about electric power production and consumption is provided in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generaton; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipits, consumption, and net generation present data first for the total, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US totals, followed by state data. Chapters on net energy for load, and peak load and net capability present US totals first, followed by regional data. The chapter on cost provides national averages followed by State averages, while the chapter on retail prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23739 (DOE/EIA—0226(82/12)) Electric Power Monthly. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Dec 1982. 101p. NTIS, PC A06/MF A01. Order Number DE83009323.

Portions are illegible in microfiche products.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. this publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US totals, followed by state data. Chapters on net energy for load, and peak load and net capability present US totals first, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retail prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

23740 (DOE/EIA—0365) US-Canadian electricity trade. Jess, M.; Serot, D.E.; Makens, J.; Cohen, G. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Nov 1982. 80p. NTIS, PC A05/MF A01. Order Number DE83008806.

Detailed information is provided on the economics of US-Canadian electric power transactions and on current and future developments in US-Canadian electric power exchangers. It is concluded that existing interconnections between US and Canadian utilities improve the stability and reliability of electric power systems in both countries and facilitate large, short-term transactions. (LCL)

23741 (DOE/EIA—035612) Projected costs of electricity from nuclear and coal-fired power plants. Volume 2. Reynolds, A. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Nov 1982. 208p. NTIS, PC A10/MF A01. Order Number DE83008812.

This report was prepared at the request of the Office of Poicy Development in the Office of Policy, Planning and Analysis, US Department of Energy, which asked that the Energy Information Administration update its economic information on future comparative costs of generating electricity from nuclear and coal-fired power plants. This information is herein made available to utility planners, financiers, industry and government analysts, policymakers, and regulatory officials. The report summarizes costs measured at the power plant bus bar and projected for 30 years of operation beginning in 1995. The report is presented in two volumes. This, second volume contains a more detailed account of the history of cost evolution for the two technologies and of the rationale, methodologies, technical assumptions, and comprehensive bibliography that underlie the entire study.

23742 (DOE/IG—116) Unrecovered costs of the headwater benefits program. (Department of Energy, Washington, DC (USA). Office of Inspector General). 20 May 1980. 28p. TIC. Order Number DE83006314.

Report to the Secretary, Deputy Secretary.

Review of 18 river basins disclosed that the Federal Energy Regulatory Commission is not recovering the day-to-day costs of operating the headwater improvements. Such costs principally include expenditures for operating personnel and consumable operational supplies. These costs are directly related to the benefits received by downstream owners, and we believe that recovering such costs would be consistent with the provisions of the Fderal Power Act. In making assessments to downstream beneficiaries for maintenance, the Commission has followed the practice of limiting its recovery of costs or ordinary and unscheduled maintenance and minor repairs and improvements. At least $500,000 in annual operating costs were not assessed at the projects we reviewed. Recommendations are included and comments to draft report are appended.

23743 **(EDF-CG-RA—1981) Progress report - operating accounts in 1981.** (Electricite de France, 75 - Paris). 1982. 132p. (In French). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750419.

Portions are illegible in microfiche products.

The first part of this report concerns EDF activities in 1981 (clientele, operations, personnel, cooperation and planning). The second part concerns the operating accounts in 1981 (profit and loss, general operations, balance sheet, production cost and income).

23744 **(EPRI-EA—2904) Issues in implementing a load-management program for direct load control. Final report.** Chan, M.L.; Carlson, R. (Energy Management Associates, Inc., Santa Clara, CA (USA)). Mar 1983. 93p. NTIS, PC A05/MF A01. Order Number DE83901831.

Portions are illegible in microfiche products.

This report describes the different activities that are entailed in implementing load management. In particular, the report focuses on the implementation of direct load-control programs. (By implementation, this report refers to the series of activities a utility company would undertake to realize the benefits of load-management programs that have been found to be cost effective.) In one comprehensive - activity chart, the interrelationship (both temporal and informational flow) of the various implementation activities are delineated. This activity chart also shows the different functional groups or departments involved in this implementation process. As a result, the activity chart serves as a good frame of reference around which utilities can schedule the activities. This report also identifies the issues related to the implementation process. These issues are categorized into general and specific. General issues affect the entire implementation process, and specific issues only selected activities within the process. Five preliminary analytical formulations were developed for each of the five of those issues. The intent was to assess how mathematical models might help to resolve these issues. Actual surveys of implementation of load management are not included in this work, and are being considered by EPRI for future research. However, inputs from a number of utilities were used to identify issues, obtain project guidance, and assure the reasonableness of the project results.

23745 **(EPRI-EL—2874) Comparison of algorithms for computing generating-system reliability indexes. Final report.** Mazumdar, M. (Pittsburgh Univ., PA (USA). Dept. of Industrial Engineering). Feb 1983. 126p. NTIS, PC A07/MF A01. Order Number DE83901863.

This report describes the results of a research project to compare the accuracy of several algorithms for computing generating-system reliability indices. The principal index considered in this report is the loss-of-load probability (LOLP) measure. The approximate procedures considered are: (a) the method of cumulants, (b) distribution fitting method, (c) large-deviation procedure, and (d) Monte Carlo Importance Sampling procedure. Preliminary results are given to indicate the application of the large-deviation procedure in production costing computations. The approximate procedures are broadly reviewed from the viewpoint of statistical theory and their possible application in generation-reliability computations. By applying these procedures to computing the reliability indices for several representative utility systems, it is observed that the large-deviation method is generally very accurate. A set of recommended procedures to be used by the industry is given, and directions for further research are outlined.

23746 **(EPRI-P—2851-SR) R and D benefits assessment - a regional approach.** Mulvaney, J.J. (Electric Power Research Inst., Palo Alto, CA (USA)). Feb 1983. 95p. NTIS, PC A05/MF A01. Order Number DE83901830.

A methodology based on the use of regional generation systems has been developed to assess the benefits of EPRI R and D programs to the utility industry. Six EPRI Regional Systems based on the NERC regions and correlated with the NERC regional characteristics were defined. Four case studies of benefits of technology improvement were conducted in 1979 and 1980 to assess the effectiveness of the regional methodology. These case studies were: (1) 1% improvement in generating plant availability, (2) 1% improvement of generating plant heat rate, (3) 1% reduction of electrical system losses of equipment added after 1978, and (4) 1% reduction in the cost of environmental control of new coal plant additions. Regional and national benefits (capital and production cost savings) were estimated. The study results show that even small technology improvements from EPRI R and D can lead to major benefits on a regional and national scale. Because of the great diversity in such regional characteristics as generation mix, growth rate, and fuel costs, R and D benefits can typically vary by a factor of 10. A regional approach to R and D benefits assessment is therfore essential.

23747 **(IKE-K—71) Chances of continued heat and power generation in public power stations in combination with district heating.** Rebstock, F.; Scheirle, N. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Jan 1982. 153p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750131.

The methodological approach is one of cost-effectiveness analysis. Based on the technical data of the system, the theoretical potential for district heating at the regional and local levels is reduced to an economically feasible potential. Gas, heating oil and district heating supplies are compared on the basis of commercial, economic and ecological criteria. Considering the centralisation versus decentralisation debate and problems of consumer acceptance, a concept of 'Angepasste Fernwaermeversorgung' (adaptive district heating) is developed. A seperate chapter discusses critically existing and desirable political, legal, governmental and administrative frameworks for district heating supply. In the final chapter, the conclusions of the paper for planning and policy are brough together. Despite its current commercial weaknesses, disdrict heating is seen as a competitive product because of increases in fuel prices and current subsidies are justified on security of supply grounds. A state wide strategy for combined heat and power district heating as well as individual local plans for integrated fuel supply systems are seen as necessary.

23748 **(MIT-EL—82-025-Exec.Summ.) Utility Spot-Pricing Study: Wisconsin.** Caramanis, M.; Tabors, R.; Stevenson, R. (Massachusetts Inst. of Tech., Cambridge (USA); Wisconsin Univ., Madison (USA)). Jun 1982. Contract AM01-76EI02295. 21p. NTIS, PC A02/MF A01. Order Number DE83006937.

The objective of the Utility Spot-Pricing Study was to evaluate, for a prototype Wisconsin electric utility, the potential benefits to both the customers and to the utility of utilizing a specific type of spot pricing for large industrial customers and to make recommendations for further experimentation and potential rate-making based upon spot pricing. In order to accomplish this objective a set of studies of both the utility and selected industrial customers was carried out and an existing simulation model was expanded to allow for incorporation of customer response to changing electrical energy prices. The conclusions of this study were that spot pricing: benefits the customer and the utility; increases system reliability; enhances the ability of distributed energy technologies to integrate into the utility system, and encourages customers to save money through decreased power usage and more advantageous timing of power usage. (LCL)

23749 **(NP—3770030) Statistical report '82.** (Zentralverband der Elektrotechnischen Industrie e.V. (ZVEI), Frankfurt am Main (Germany, F.R.)). 1982. 56p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83770030.

Portions are illegible in microfiche products.

After a summary of the development of the electrical engineering industry in the F.R. of Germany in 1981 a detailed set of tables presents the most important characteristic data of this industrial branch. The topics were divided into the main groups of production and prices, orders and turnover, employment, foreign trade, regional branches of the electrical industry.

23750 **(RAND/N—1709-DOE) Selected papers from the energy workshop: industry perspectives on pioneer process plants.** Horvath, R.E. (ed.). (RAND Corp., Santa Monica, CA (USA)). Jul 1981. Contract AC01-79PE70078. 136p. (CONF-8009307—Exc.). NTIS, PC A07/MF A01. Order Number DE83008161.

From Workshop on industry perspectives on pioneer process plants; Washington, DC, USA (17 Sep 1980).

Portions are illegible in microfiche products.

During the past two years, The Rand Corporation has been investigating the accuracy and reliability of initial project estimates for first-of-a-kind process plants. The investigation sought to determine the causes of cost growth and poor plant performance in innovative projects similar to those with which the Department of Energy will be concerned. That effort led to further study of the management, technology, and cost estimation of pioneer process plants. This Note documents the results of a workshop, Industry perspectives on Pioneer Process Plants, held in the Rand Washington Office, September 17, 1980, to discuss process plant management, technology, and cost issues that would be of interest to the Department of Energy. Representatives of Rand and of the chemical and petrochemical industries participated in the workshop. Because this Note simply documents selected workshop presentations, it has not been subjected to the usual Rand review process. Two separate abstracts have been prepared for individual items for inclusion in the Energy Data Base.

23751 (RAND/N—1709-DOE, pp 4-30) **Economies of scale in electrical generating plants.** Fisher, J. Jul 1981. NTIS, PC A07/MF A01. Order Number DE83008161.

From Workshop on industry perspectives on pioneer process plants; Washington, DC, USA (17 Sep 1980).

Portions are illegible in microfiche products.

The economies of building and operating both larger and smaller thermal power plants, nuclear or fossil-fueled, are compared on the basis of design and construction costs, operating and maintenance costs, and capacity or reliability. Some of the diseconomies of scale are that larger plants require longer periods to plan and uild than smaller plants have a lower capacity factor, low reliability, i.e. break down more often, and higher maintenance costs. (LCL)

23752 **(TVA/OP/EUDR—83/3) 1981 commercial and industrial survey: customers of municipal and cooperative distributors of TVA power.** (Tennessee Valley Authority, Chattanooga (USA). Office of Power). Feb 1983. 34p. NTIS, PC A03/MF A01. Order Number DE83901687.

The 1981 Commercial and Industrial Survey was undertaken to obtain information about general power customers served by the municipal and cooperative distributors of TVA power in order to forecast the electricity requirements of the region and to serve program planning and evaluation needs. The survey provides the following baseline estimates for commercial and industrial customers: distribution of establishments by Standard Industrial Classification, energy consumption, energy conservation and load management measures, and establishment characteristics. Available also from the survey are estimates of cogeneration and self-generation of electricity and planned growth for some customers. Survey estimates indicate that the distributor-served commercial and industrial sector is characterized by considerable diversity in type and size of establishments, as well as by variability in fuel and end-use saturations. Electricity, having a saturation of 100%, is the fuel most commonly used by Valley establishments. With a saturation of 47.0%, natural gas is the next most commonly used fuel. Electricity end-use saturations inlcude lightining at 98.2%, space cooling at 76,6%, and space heating at 62.3%. A variety of measures to save energy have been undertaken by Valley establishments. Nearly 14% of the establishment have either had or requested a TVA energy management survey. A fuller treatment of these and other survey findings is provided in the body of this report.

23753 **Electric generator.** Foster, J.S.; Mcdonald, C.A.; Wilson, J.R. (to Dept. of Energy). US Patent 4,370,576. 25 Jan 1983. Filed date 21 Feb 1962. vp.

PAT-APPL-175393.

In an electrical energy generator, the combination comprisin a first elongated annular electrical current conductor having at least one bare surface extending longitudinally and facing radially inwards therein, a second elongated annular electrical current conductor disposed coaxially within said first conductor and having an outer bare surface area extending longitudinally and facing said bare surface of said first conductor, the contiguous coaxial areas of said first and second conductors defining an inductive element, means for applying an electrical current to at least one of said conductors for generating a magnetic field encompassing said inductive element, and explosive charge means disposed concentrically with respect to said conductors including at least the area of said inductive element, said explosive charge means including means disposed to initiate an explosive wave front in said explosive advancing longitudinally along said inductive element, said wave front being effective to progressively deform at least one of said conductors to bring said bare surfaces thereof into electrically conductive contact to progressively reduce the inductance of the inductive element defined by said conductors and transferring explosive energy to said magnetic field effective to generate an electrical potential between undeformed portions of said conductors ahead of said explosive wave front.

2980 Consumption And Utilization

REFER ALSO TO CITATION(S) 22979, 23002, 23032, 23694, 23793, 23843, 23857

23754 **(CONF-8104198—1) Community energy audit: a discussion of process, resources, and potential problems.** Pferdehirt, W.P. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 18p. NTIS, PC A02/MF A01. Order Number DE83008653.

From American Planning Association conference on national planning; Boston, MA, USA (24 Apr 1981).

Portions are illegible in microfiche products.

Community energy-audit process in general, several published audit methodologies, suggested audit data sources, and problems likely to be encountered in conducting an audit are discussed. The major suggestions follow: (1) balance allocated time and money with the resources for the planning process; (2) maintain interaction between audit and the remainder of the planning process; and (3) select structure and computational procedures meet the anticipated applications of the audit. Rely on existing data sources and informants primary data collection. Anticipate problems in data collection and application.

23755 **(DOE/EIA—0035(83/01)) Monthly Energy Review.** (USDOE Energy Information Administration, Washington, DC). Jan 1983. 106p. NTIS, PC A06/MF A01. Order Number DE83008802.

Energy production during the first 10 months of 1982 totaled 53.9 quadrillion Btu, virtually unchanged from the level of production during the same period of 1981. Natural gas production decreased 7.7%. Increases in production occurred for petroleum and coal. Petroleum production was up 0.6% and coal 4.3%. All other forms of energy production combined were up 10.9%. Energy consumption during the first 10 months of 1982 totaled 58.9 quadrillion Btu, a 3.7% decrease compared to consumption during the same period of 1981. Decreases occurred in the consumption rates of petroleum (5.0%), natural gas (6.6%), and coal (3.0%), accounting for the overall decline in energy consumption during this period. The consumption rate of all other forms of energy increased 10.3%. Net imports of energy during the first 10 months of 1982 totaled 5.9

quadrillion Btu, 27.6% below the level of the first 10 months of 1981. Net imports of petroleum decreased 23.0%, and net imports of electricity and coal coke combined decreased 3.6%. Natural gas net imports increased 7.4%. Net exports of coal increased 4.2%.

23756 (DOE/EIA—0328) Residential energy consumption survey. Consumption patterns of household vehicles, supplement: January 1981-September 1981. (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Feb 1983. 52p. NTIS, PC A04/MF A01. Order Number DE83009374.

Portions are illegible in microfiche products.

Information on the fuel consumption characteristics on household vehicles in the 48 contiguous States and the District of Columbia is presented by monthly statistics of fuel consumption, expenditures, miles per gallon, and miles driven.

23757 (PB—83-140228) The growth of energy consumption and prices in the USA, FRG, France, and the UK, 1950-1980. Final report. Doblin, C.P. (International Inst. for Applied Systems Analysis, Laxenburg (Austria)). [nd]. 152p. NTIS, PC E06/MF E06.

This report outlines the long-term growth of GDP, total primary energy consumption, and industrial output with particular reference to the meaning of the recent 'breaking of the energy coefficient'. A major part of the report is devoted to the growth of energy prices, current and adjusted for inflation, and the response by the consuming sectors - industry, households, and road transportation - for groups of energy products. The savings of given energy commodities by industries and households are analyzed in the light of changes in both industrial output and switches from coal and petroleum to natural gas and electricity, and occasionally back to coal.

2990 Unconventional Sources And Power Generation

REFER ALSO TO CITATION(S) 23246, 23254, 23256, 23302, 23307, 23375, 23873, 23877

23758 (DOE/EIA—0360(81)) 1981 Active-Solar-Installations Survey. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Dec 1982. Contract AC01-80EI10231. 80p. NTIS, PC A05/MF A01. Order Number DE83008808.

The survey gathered data on active residential and commercial solar systems installed during calendar year 1981 and a listing of firms involved in various aspects of the industry. The mail and telephone followup survey results are presented in 21 tables for combined national and state data. The total number of installations reported nationwide during 1981 was 122,907. Almost 95% of all reported installations were made in the single-family residential sector. The fewest quantity of installations (1.2%) was reported in the commercial sector. The remaining 4% was reported in the multifamily residential sector. Water heaters represented the largest number of systems installed in single-family, multifamily, and commercial buildings. The average size of water-heating systems in single-family homes was 61 square feet with an average cost of $3,235. Pool heaters represented the second largest number of systems installed in single-family and multifamily homes and represented 16.4% of the total installations. The average size of pool heaters in single-family homes was 376 square feet with an average cost of $3,455.

23759 (PB—83-129031) Appropriate technologies for basic energy needs in rural India. Working paper. Roy, R. (Open Univ., Milton Keynes (UK). Alternative Technology Group). Feb 1980. 25p. NTIS, PC E03/MF E03.

The objectives of this study were to: estimate the total village energy requirement for domestic needs; determine energy potential available from biogas, wind, solar, mini-hydroelectric, and low temperature wood carbonization sources; identify suitable plant design for these sources and estimate costs; and recommend the most economic and efficient form from each source for the village. Energy use patterns were determined and reported, and technological options listed. There are no conclusions; the report is to be used to study options to determine the best ones for a particular circumstance.

23760 (PB—83-146654) Identification of types of businesses with potential interest in operating and/or exporting ocean thermal energy conversion (OTEC) plants. (Unified Industries, Inc., Springfield, VA (USA)). Sep 1982. 37p. NTIS, PC A03/MF A01.

This study describes the characteristics of three selected Ocean Thermal Energy Conversion (OTEC)-based lines of business, examines other lines of business and identifies those with similar characteristics, and indicates the types of businesses/corporations that could be expected to have potential interest in operating and/or exporting OTEC plants. An OTEC line of business model is developed to assist companies in making an internal corporate assessment as to whether OTEC should be in their business plan.

23761 (SERI/STR—211-1827) Foreign applications and export potential for wind-energy systems. Griffith, S.K.; Cabraal, A.; Abercrombie, J.T.; Groveman, B.; Easterly, J.; Swaminatha, K. (Planning Research Corp., McLean, VA (USA); DHR, Inc., Washington, DC (USA)). Dec 1982. Contract AC02-77CH00178. 307p. NTIS, PC A14/MF A01. Order Number DE83009715.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Foreign countries are identified in which wind applications appear to be competitive with conventional energy sources and in which the barriers to US exports do not appear to be excessive. The study, which was required by the Wind Energy Systems Act of 1980 (PL 96-345), is worldwide in scope and relies almost exclusively on data compiled by other organizations. Data on wind resources, imports, import restrictions, licensing requirements, exchange controls, dependence on energy imports and balance-of-payments are presented for 184 countries and territories. Data on 27 wind applications were also collected, a catalogue of wind machines suitable for export was developed and each application was evaluated as a function of wind speed, projected wind machine cost and appropriate discount rate.

23762 International directory of new and renewable energy information sources and research centres. First edition. Paris, France; United Nations Educational, Scientific and Cultural Organization (1982). 485p. (DOE/NBM—3007922). SERI, 1617 Cole Boulevard, Golden, CO 80401 $35.50. Order Number DE83007922. Contract AC02-77CH00178.

This edition contains a total of 2955 entries representing 139 countries. There are national, regional and international organizations and publications included, covering governmental, private or academic affiliations. For the purpose of the Directory, new and renewable energy areas of interest are identified as follows: alcohol fuels; biomass/bioconversion; conservation; draught animals; fuelwood and charcoal; geothermal power; hydropower; ocean energy; oil shale, tar sands; peat; photovoltaics; solar heating and cooling; solar thermal energy; solar general; and wind. Only major organizations or publications are included. The Directory is comprised of four sections appearing in the following order: Listings by Country, Publications Index, Subject Index and Organization Index. In addition, there are two Appendices: one details the numbers and type of entries each country has while the other lists the references used by Unesco.

30 DIRECT ENERGY CONVERSION

3001 Mhd Generators

REFER ALSO TO CITATION(S) 23299

23763 (AD-A—120526/9) High power pulsed plasma MHD experiments. Annual report 1 Jan 81-30 Sep 82. Baum, D.W.; Gill, S.P.; Shimmin, W.L.; Watson, J.D. (Artec Associates, Inc., Hayward, CA (USA)). 30 Sep 1982. 48p. NTIS, PC A03/MF A01.

Results of high power pulsed plasma MHD experiments are reported. An explosively driven plasma source is used to drive a Faraday mode MHD generator with an externally applied B-field of several tesla. The highest power achieved was 6 gigawatts in a 140 kJ electrical pulse delivered to a resistive load. The experimentally observed scaling relationships of power with applied B-field and electrode area are also presented.

23764 **(ANL/NESC—783) SLGTR; slag transport models for duct surfaces.** Chow, L.S.H. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048783.

The inlet conditions and physical properties of the combustion gas and the slag film are supplied as input data by the user. The model is not valid for a solid slag film.

The program simulates the condition of a partly liquid slag film flowing on a cooled vertical or horizontal wall of a large duct, through which pass slag-laden combustion gases. It computes the axial variations of gas temperature, radiative and convective heat fluxes from the hot combustion gas to the cooled wall, and thickness, temperature, and velocity distributions of the slag film. The program is useful in performing design calculations for a radiant-heater concept in the downstream system of an MHD power plant.IBM360,370; FORTRAN IV; OS/370; The program requires approximately 190K bytes of memory and standard input and output units for execution.

23765 **(ANL/NESC—811) COMB; 1-dimensional high-temperature coal combustor model.** Chung, P.M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048811.

Reference report, ANL/MHD-77-2.

COMB performs a steady-state one-dimensional analysis to predict overall behavior of a high-temperature coal combustor for use in open-cycle MHD power-generation systems. Following ignition a one-dimensional flow model with radiative heat loss is used to describe the subsequent vaporization of ash and devolatilization, combustion, and gasification of the coal. Combustion is considered to take place either at a flame sheet in the diffusion layer surrounding each particle or at the particle surface. Redistribution of combustion products in the main gas stream of the combustor is assumed to occur according to simplified chemical equilibrium criteria, and the various competing reactions within the coal particle are resolved by use of a simplified devolatilization rate formula.IBM370; PL/I; OS/370; 130K bytes of storage are needed.

23766 **(ANL/NESC—845) COMRC1; slag transport models for MHD systems.** Chow, L.S.H. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048845.

Maxima of 50 increments along the axis of the vessel, 40 increments across the slag film The program is not valid for a solid slag film.

In a coal-fired, open-cycle MHD system, all downstream component surfaces that are exposed to combustion gases will be covered by a solid, liquid, or solid-liquid film of slag in which some of the potassium seed is dissolved. The specific nature of the film will depend on the physical and optical properties of the slag and seed and on local thermal conditions. The COMRC1 program simulates the condition of a partly-liquid film flowing downward on a cooled vertical, opaque wall. The dominant mode of heat transfer to the film surface is the radiant heat flux from the slag-laden combustion gas. Either an opaque or a semitransparent slag film can be treated. The axial variations of gas temperature to the cooled wall and thickness, temperature, and velocity distributions across the slag film are computed. The program is useful in performing design calculations or parametric studies for a radiant-heater concept in the downstairs system of an MHD power plant.IBM360,370,303x; FORTRAN IV; OS/370; Approximately 250K bytes of memory and standard input and printer output units are required for execution.

23767 **(CONF-810106—5) Effect of secondary combustion on nitric oxide concentrations in a MHD combustion gas.** Dunn, P.F.; Johnson, T.R.; Reed, C.B.; Chasanov, M.G.; Inbody, M.A. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83008647.

From 19. Aerospace Sciences meeting; St Louis, MO, USA (12 Jan 1981).

Portions are illegible in microfiche products.

Results are presented of recent investigations of the effect of secondary combustion on nitric oxide (NO) concentrations in an MHD combustion gas. Forty-one experiments, in which NO concentration measurements were made, were conducted at the Argonne MHD Process Engineering Laboratory (AMPEL). In sixteen of those experiments, secondary combustion of the MHD combustion gas was achieved over two temperature ranges (1500 to 1800°K and 1700 to 2000°K). A model assuming instantaneous mixing, and using an Argonne modification of the NASA chemical kinetics code, predicted to within 10% for all clean-fuel experiments conducted the measured changes in NO concentrations that resulted from secondary combustion. This model was extended to estimate changes in NO concentrations that would occur during secondary combustion in a larger MHD facility. It is established that, in addition to other parameters including mixing, the heat loss from the secondary combustion zone strongly influences the amount of NO reformed during secondary combustion.

23768 **(CONF-810106—6) U-25B MHD-generator performance.** Doss, E.; Picologlou, B.F.; Pan, Y.; Petrie, T. (Argonne National Lab., IL (USA); Southern Illinois Univ., Carbondale (USA). Dept. of Thermal and Environmental Engineering). 1981. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83008620.

From 19. Aerospace Sciences meeting; St Louis, MO, USA (12 Jan 1981).

Portions are illegible in microfiche products.

The performance of the U-25B MHD generator is analyzed with theoretical predictive models developed at Argonne National Laboratory. Modifications and improvements of the computer codes, motivated from study of the experimental results, are outlined and discussed. The theoretical predictions are compared to experimental results and good agreement is found. Sensitivity studies involving a number of input parameters are used to identify those parameters that have a strong impact on generator performance.

23769 **(CONF-810106—7) Off-design study of an open cycle MHD power plant with oxygen enrichment.** Geyer, H.K.; Berry, G.F. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83008614.

From 19. Aerospace Sciences meeting; St Louis, MO, USA (12 Jan 1981).

Portions are illegible in microfiche products.

This paper undertakes to explore some of the more important aspects of off-design operation for an MHD power plant. An essential requirement is that the plant be designed to meet part-load and overload conditions. Furthermore, the optimal design should be subject to a specified load demand curve. For off-design regimes, an analysis is made to determine the compatible joint operating conditions for an MHD topping cycle, a steam bottoming plant, a turbine train, a compressor, and an oxygen separation plant. The analysis performed is subject to constraints (e.g. metal temperatures, second law violations, component performance requirements, environmental considerations).

23770 **(CONF-810106—8) Heat transfer in slagging MHD radiant boilers.** Im, K.H.; Ahluwalia, R.K.; Berry, G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83008615.

From 19. Aerospace Sciences meeting; St Louis, MO, USA (12 Jan 1981).

Portions are illegible in microfiche products.

A combined convection-radiation model is formulated to study heat-transfer characteristics of slagging MHD radiant boilers.

The model includes the contributions of carbon dioxide, water vapor, potassium atoms, and slag particles to gas radiation. The model also accounts for the presence of slag layer on the wall of the radiant boiler. In order to determine the slag layer dynamics, the mechanism of slag-particle deposition by thermophoresis and by fluid turbulence is also investigated. The role of a slag layer in moderating the influence of refractory thickness on heat transfer is illustrated. From the viewpoint of NO/sub x/ decomposition, the calculations indicate that an adequately slow cooling rate of the combustion gas can be realized in the radiant boiler.

23771 **(CONF-810574—2) Application of polyalgorithmic optimization to MHD power plant design.** Berry, G.F.; Cook, J.M.; Dennis, C.B. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008515.

From International Association of Science and Technology for Development energy symposium; San Francisco, CA, USA (20 May 1981).

Portions are illegible in microfiche products.

In the optimization of large engineering systems, complexity can introduce difficulties that are not only greater in amount than, but also different in kind from those presented by simpler systems. Behavior of the objective function may vary widely and unpredictably over the feasibility region, so that no one class of algorithms is capable of identifying the optimum. Polyalgorithmic optimization has been proposed as a way to cope with this problem. The authors have implemented an elementary polyalgorithmic strategy in GSMP, our executive program for general system modeling. Four standard nonlinear optimization algorithms are used, ordered according to the degree of local smoothness in the objective function for which they were designed. In a control section of GSMP, an estimate of that smoothness is maintained (local to the point being investigated), and an algorithm selected accordingly, taking into account the history of the optimization processes up till that time. This procedure is used to determine the optimum design of an MHD power plant with respect to minimization of the cost of electricity. Combustor pressure, combustion air preheat temperature, combustor heat loss, magnetic field of the MHD generator, the channel load factor, and the diffuser pressure recovery coefficient were selected as independent parameters.

23772 **(CONF-820814—38) Performance advantages of a gas-stream MHD retrofit.** Berry, G.; Dennis, C.; Johnson, T.; Minkov, V.; Petrick, M. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008644.

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

Portions are illegible in microfiche products.

Retrofitting existing power plants with an open-cycle MHD system has been re-examined in light of recent developments in the technology of MHD steam-bottoming plants. A new retrofit-cycle configuration has been examined, which provides for a direct gas-gas coupling. With this arrangement, the MHD-topping plant can be decoupled so that the existing plant can be operated either with the MHD cycle or separately. When applied to Vermilion Station Boiler No. 1, a coal-fired power plant presently in operation in Illinois, the retrofit concept produces substantial increases in overall-plant efficiency, total electrical output, and cost effectiveness.

23773 **(DOE/ET/10815—58) MIE scattering theory for particle sizing interferometry with the dual beam laser velocimeter.** Pendleton, J.D. (Tennessee Univ., Tullahoma (USA). Space Inst.). Feb 1983. Contract AC02-79ET10815. 164p. NTIS, PC A08/MF A01. Order Number DE83009249.

Portions are illegible in microfiche products. Original copy available until stock is exhausted; Thesis.

An analytical solution for the light scattered by a sphere located in the cross over region of two laser beams is developed to allow computation of the visibility parameter for in situ particle sizing. The solution provides for evaluation of the visibility particle sizing concept for application to high temperature coal-fired magnetohydrodynamic electrical power generation. The solution is very general since it is applicable to laser beams with any desired wavelength, propagation directions and polarization orientations and to light collecting apertures of any size and location. Therefore, the solution provides for comparative selection of optical configurations for optimal implementation of the visibility particle sizing technique in the severe environment of coal-fired magnetohydrodynamics. The visibility solution is developed from a detailed solution of the Mie theory scattering problem obtained by using the vector multipole field method. Group theory is used to develop a generalized expression of the Mie solution for coordinate systems rotated with respect to the coordinates of the laser beam as conventionally chosen for the Mie problem. Explicit expressions for expansion coefficients of the generalized Mie solution expression are given which allow the coefficients to be obtained from recursion relations for associated Legendre functions, thus avoiding evaluation of Jacobi polynomials or hypergeometric series. In addition, a numerical integration algorithm for the computer calculation of visibility parameter is developed for the particle sizing interferometer (PSI) with a circular light collecting aperture.

23774 **(DOE/ET/10815—61) Evaluation of a modified-line-reversal temperature measurement in coal-fired MHD plasmas.** Winkleman, B.C. (Tennessee Univ., Tullahoma (USA). Space Inst.). Feb 1983. Contract AC02-79ET10815. 98p. NTIS, PC A05/MF A01. Order Number DE83007693.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The application of the modified-line-reversal technique for measurements of the plasma temperature of coal-fired magnetohydrodynamic power generators is studied. The optical system employed is analyzed to allow its effects to be included into the general modified-line-reversal equations. Furthermore, the size of images produced by the optical system are obtained and used to calculate measured temperature inaccuracies due to misalignment of the optics. The analysis of the optical system is used to characterize the error produced by slag-blocked optical ports. Plasma-temperature measurements were made under a variety of thermodynamic conditions. The temperature measurements made with the modified-line-reversal apparatus were supplemented with simplified plasma luminosity measurements. In conjunction with the modified-line-reversal temperature, the luminosity measurements allowed calculation of temperature profiles. The experimental results were used to analyze the operation of the modified-line-reversal apparatus and to obtain estimates of the errors introduced by the low-temperature boundary layer and particles in the flow stream. The major results of the investigation are the criteria found to be important in the design of the optical system and the conclusion that the modified-line-reversal technique is suitable for coal-fired flows.

23775 **(DOE/ET/11056—T7) Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982.** Bloom, M.H. (Polytechnic Inst. of New York, Farmingdale (USA)). 1982. Contract AC01-78ET11056. 103p. NTIS, PC A05/MF A01. Order Number DE83005896.

Portions are illegible in microfiche products.

The aim of this program is to contribute to certain facets of the development of the MHD/coal power system, and particularly the CDIF of DOE with regard to its flow train. Consideration is given specifically to the electrical power take-off, the diagnostic and instrumentation systems, the combustor and MHD channel technology, and electrode alternatives. Within the constraints of the program, high priorities were assigned to the problems of power take-off and the related characteristics of the MHD channel, and to the establishment of a non-intrusive, laser-based diagnostic system. The next priority was given to the combustor modeling and to a significantly improved analysis of particle combustion. Electrode studies were held in abeyance, being assigned a low priority here, by necessity. Also discontinued was a study of two-dimensional boundary layer effects in the MHD channel.

23776 **(DOE/NBM—3008436) Provisional values for the thermodynamic properties of potassium sulfide.** Ruppel, T.C. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). 1975. 11p. NTIS, PC A02/MF A01. Order Number DE83008436.

Alkali metal sulfate reduction at elevated temperature is sometimes involved in the removal of sulfur oxides from stack gases. In our work concerning sulfur removal from potassium sul-

fate-fly ash mixtures produced during coal-fired magnetohydrodynamic (MHD) power generation, we have needed thermodynamic data for potassium sulfide. Using experimental heat content data of Dworkin and Bredig and a value of the heat of formation at 298°K taken from the National Bureau of Standards Circular 500, a provisional table of thermodynamic data for K_2S in the solid and liquid phases has been generated. The heat capacity, entropy, Gibbs energy function, enthalpy difference between T and 298°K, heat of formation, Gibbs energy of formation, and common logarithm of the equilibrium constant of formation were calculated from experimental heat content data published by Dworkin and Bredig and are tabulated from 0 to 1500° K.

23777 **Fabrication experiences of the Coal-Fired Flow Facility superconducting dipole magnet.** Wang, S.T.; Ludwig, H.; Lieberg, M. (Argonne Natl Lab, IL, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 2190-2193(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The Argonne National Laboratory has constructed a large aperture superconducting MHD magnet for use in the Coal-Fired Flow Facility at the University of Tennessee Space Institute at Tullahoma, Tennessee. The magnet will generate a peak on-axis field of 6 T in a MHD warm bore of 80 cm diam at inlet, 100 cm diam at exit, and 300 cm effective length. The stored energy of the magnet will be 168 mj, the cold mass (4.2 K) will be 131 metric tons and the ampere-turns, 13.7*10/sup 6/. The final design of the magnet is introduced. Experiences of coil winding and coil assembly, the assembly of force-containment superstructure and assembly of magnet cryostat are described. 1 ref.

23778 **Measurements of mechanical properties of superstructures materials for the CFFF superconducting MHD magnet.** Wang, S.T.; Genens, L.; Elmer, J.W.; Brown, E.L.; McHenry, H. (Argonne Natl Lab, IL, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 2308-2311(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

Argonne National Laboratory is constructing a large superconducting MHD magnet to be used in the Coal-Fired Flow Facility (CFFF) at the University of Tennessee Space Institute. Measurements of the mechanical properties of all the materials used in the superstructure (bore tube, cast flanges and deposited weld metal, cast girder segments, aluminum girders, tie plates and connecting pins) have been performed. These measurements consisted of tensile strength, yield strength, % elongation, and reduction of area at 295, 76 and 4 K. Charpy "V" notch impact tests at 23 K were used for material acceptance with additional impacts done at 76 and 295 K. To verify ductility at the 4 K operating temperature, elastic-plastic J-integral fracture toughness tests at 295, 76 and 4 K along with associated fatigue crack growth rate data were generated. Results of these measurements are discussed. 2 refs.

23779 **United States Superconducting MHD Magnet Technology Development Program.** Dawson, A.M.; Marston, P.G.; Thome, R.J.; Iwasa, Y.; Tarrh, J.M. (MIT, Cambridge, MA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 1966-1969(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

A three-faceted program supported by the U.S. Dep of Energy is described. These facets include basic technology development, technology transfer and construction by industry of magnets for the national MHD program. The program includes the maintenance of a large component test facility; investigation of superconductor stability and structural behavior; measurements of materials' properties at low temperatures; structural design optimization; analytical code development; cryogenic systems and power supply design. The technology transfer program is designed to bring results of technology development and design and construction effort to the entire superconducting magnet community. The magnet procurement program is responsible for developing conceptual designs of magnets needed for the national MHD program, for issuing requests for quotation, selecting vendors and supervising design, construction, installation and test of these systems. 9 refs.

23780 **Safety consequences of shorted turns in a cryostable superconducting magnet.** Turner, L.A.; Hilal, M.A. (Argonne Natl Lab, IL, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 2015-2018(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

A combined thermal and electromagnetic analysis has been carried out for a shorted turn in a cryostable superconducting magnet during charging or discharging. Three analyses are reported. In the first, the joule heat generated in the short and the shorted turn is assumed to heat the turn to a temperature from which that heat will be transferred to the liquid helium coolant. The reduction in heat due to the enthalpy change of the conductor is ignored. The second incorporates enthalpy change of the conductor and heat transfer to the liquid helium. The turn temperature is determined from a heat balance, including the specific heats of all materials in the conductor. The effect of current sharing is included. For the third, the electromagnetic analysis has been incorporated into a quench and safety analysis program to provide for current division between the shorted turn and the short and for heat generation at the short. The three analyses have been applied to the superconducting magnet under construction at Argonne National Laboratory for MHD research. The analyses predict that, for the values that could be expected for short resistance and discharge time, a shorted turn would not lead to high temperature or other serious consequences. 2 refs.

3003 Thermoelectric Generators

REFER ALSO TO CITATION(S) 23201

3004 Thermionic Converters

REFER ALSO TO CITATION(S) 23858

3005 Fuel Cells

23781 **(ANL-K—83-12-Pt.1) Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program.** (Giner, Inc., Waltham, MA (USA)). Feb 1981. Contract W-31-109-ENG-38. 106p. NTIS, PC A06/MF A01. Order Number DE83008715.

Portions are illegible in microfiche products.

High-temperature dry scrubbing of coal synthesis gas is an attractive solution for sulfur removal from the molten-carbonate fuel-cell feed stock. Considerable success has been achieved by the use of iron oxide/silica sorbents as hot regenerable agents for the removal of the main portion of the sulfur present as H_2S in fuels produced by coal gasification. This first-stage sulfur removal would reduce the sulfur content of the gas from ~ 0.6 vol % to about 200 PPMV H_2S. An urgent need exists, however, for the development of a second-stage hot regenerable-adsorbent system to reduce the ~ 200 to 300 PPMV H_2S typical of the effluents from the hot (~ 650°C) primary stage iron oxide/silica sorbent to the levels of ~ 1 PPMV H_2S mandatory for protection of the molten-carbonate fuel cell. The purpose of the present program is to identify and evaluate promising sorbents capable of sulfur removal, as H_2S, from levels of ~ 200 to 300 PPMV to levels of the order of ~ 1 PPMV with acceptable sulfur loading capacity and with the thermal and structural stability prerequisite to providing a high order of regenerability and a long useful life. The program reported on has consisted of the following tasks: an evaluation of the desulfurization/regeneration performance of unsupported V_2O_5/V_2O_3, WO_3/WO_2 and CuO/Cu sorbents, an evaluation of the desulfurization/regeneration performance of supported V_2O_5/V_2O_3 sorbents, an investigation of alternate routes for the regeneration of ZnO, exploratory research to identify promising new sorbents and finally the development of a desulfurization model to facilitate design of sorbent beds.

23782 (ANL-K—83-12-Pt.2) Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program. Jalan, V. (Giner, Inc., Waltham, MA (USA)). Jul 1981. Contract W-31-109-ENG-38. 21p. NTIS, PC A02/MF A01. Order Number DE83008714.

The desulfurization capabilities of three copper adsorbents (unsupported copper oxide, copper supported on silica and copper oxide - zinc oxide mixture) have been evaluated. Bench-scale desulfurization tests with fixed-bed adsorbent configurations were conducted over the temperature range from 500 to 650°C at space velocities ranging from 700 to 2500 hr^{-1} with gas mixtures consisting of 200 PPMV H_2S in hydrogen. Adsorbent regeneration was conducted using various combinations of air oxidation (including steam air mixtures) at 500 to 750°C and thermal decomposition in nitrogen at 700 to 800°C. Hydrogen prereduction at temperatures ranging from 250 to 650°C prior to desulfurization was also evaluated. Sulfur loadings at breakthrough concentrations of 10 to 12 PPMV H_2S were determined to attain maxima for the desulfurization test conditions used of 3 wt % for the CuO/ZnO adsorbent, 1.8 wt % for the copper supported on silica and 0.19 wt % for the unsupported copper oxide. These sulfur loadings correspond to utilizatoin of about 9, 28 and 0.5%, respectively, of the theoretical capacities of these adsorbents.

23783 (BMFT-FB-T—79-103) Development of a crude gas/air fuel cell system. Boehm, H.; Fleischmann, R.; Heffler, J. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Apr 1978. 39p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750338.

Portions are illegible in microfiche products.

A matrix-type fuel cell with WC-anode and Pt-cathode was developed operating at 150°C with concentrated phosphoric acid as the electrolyte. Batteries with 5 and 40 cells were stacked together delivering an output up to 8 W/cell under H_2/air. No decay in the power density could be observed in long term tests over more than 5000 hours. These tests also showed no problems in the water balance of the batteries and proved a maintenance-free operation of the stacks.

23784 (BMFT-FB-T—79-140) Electrodes and diaphragms for fuel cells. Vielstich, W.; Knauf, E.; Schladitz, H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Dec 1977. 50p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750336.

Electrodes of polycrystalline iron- and nickel-whiskers were investigated for use in water electrolysis and as supporting material in fuel cells. Electrodes of different thickness and layers of different catalysts were studied. The best results were obtained with the following electrode which was used as an anode and a cathode in half cells - a nickel-whisker-electrode of thickness of 2 mm and pores' volume of 70% sintered in H_2 atmosphere at 800°C. A laboratory electrolyser worked with 40 cm^2 electrodes (anode: nickel whisker, cathode: thermo-sprayed Raney nickel). During long time investigation the following points were measured at 60°C: 250 mA/cm^2 - 1,77 V; 500 mA/cm^2 - 1,99 V. Whisker electrodes had to be covered by platinum when they were used in a glycol-air fuel cell. The activity of these electrodes is strongly dependent on platinum layer formation and on the nature of the supporting material.

23785 (BMFT-FB-T—80-055) 20 kW fuel cell units of compact design. Pt. 1, 2. Gruene, H.; Hoehne, K.; Strasser, K.; Stuewe, B.;. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Oct 1980. 614p. (In German). NTIS (US Sales Only), PC A99/MF A01. Order Number DE83750356.

Portions are illegible in microfiche products.

A 7 kW compact fuel cell set was developed embodying considerable improvements both with respect to the specific power data, attributable to an increase in the power density and to the design, as well as to the feasibility of economic manufacture due to the production methods employed. An initial prototype was built and tested in the laboratory. The envisaged technical data of the set were attained in large measure. Certain modifications to the components still have to be made.

23786 (BMFT-FB-T—80-056) 20 kW fuel cell units of compact assembly. Pt. 3. Weyl, D. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Oct 1980. 39p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750357.

Production processes for the manufacture of fuel cell aggregates were examined under factory conditions, the production parameters for the catalyzer, electrode and plastic frame were optimized, and the necessary production equipments were designed, built and tested. A start was made with the manufacture of components for the prototype aggregates.

23787 (BMFT-FB-T—80-057) 20 kW-fuel cell units by compact assembly. Pt. 4. Mund, K. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Oct 1980. 170p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750358.

Portions are illegible in microfiche products.

In The coordinated research work, parameters have been investigated which limit the performance of porous electrodes and which are of importance in the further development of electrodes. The experimental results were analyzed using a mathematical model. Service tests were carried out to evaluate the stability of the catalysts.

23788 (BMFT-FB-T—80-058) 20 kW-fuel cell units of compact assembly. Pt. 5. Grave, B. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Sep 1980. 231p. (In German). NTIS (US Sales Only), PC A11/MF A01. Order Number DE83750359.

Portions are illegible in microfiche products.

For the production of hydrogen, steam reforming of methanol was examined by systems analysis and experimental work. An estimate was produced of the manufacturing costs of a fuel cell aggregate with a capacity of 20 kWsub(el). For purpoes of comparison, a study was also made of hydrogen production by ammonia cracking.

23789 (BMFT-FB-T—80-059) 20 kW fuel cell units of compact assembly. Pt. 6, 7. Braun, R. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 70p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750360.

Portions are illegible in microfiche products.

Documentation was prepared for the dimensioning and circuit arrangement of fuel cell aggregates in units of different capacities and for the electrical design of the associated converters. For the utilization of fuel cell aggregates in power supply systems, plans were produced with two different tasks (special standby power supplies) in mind. These plans deal with the technological problems involved and describe technical realization possibilities. Further studies were concerned with the use of fuel cells to improve the availability of public power supply systems or systems in isolated operation.

23790 (DOE/SF/01240—T1) Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978. Kaufman, A.; Stawsky, A. Perretta, A.T. (Engelhard Minerals and Chemicals Corp., Edison, NJ (USA). Research and Development Dept.). 1978. Contract AC03-76SF01240. 467p. (SAN—1240-1). NTIS MF A01. Order Number DE81029339.

Microfiche only, copy does not permit paper copy reproduction.

The effort was divided into the following four main areas: study program for the utilization of industrial waste hydrogen in fuel cells (Task I); design of a waste hydrogen utilization facility in a fuel cell application (Task II); design and development of phosphoric acid fuel cell stacks (Task III); and study and survey of materials and processes for carbon bipolar plates (Task IV). In the Task I effort 32 industries were identified as sources of by-product hydrogen in a subcontract study by Radian Corporation. The hydrogen-containing streams were also quantified and characterized. Nine selected industries were subsequently analyzed by Englehard

to determine economic feasibility for fuel cell application. The results generally provide incentive for fuel cell retrofit in plants currently using the streams for heating value. The Task II effort provided a proposed fuel cell and related system design for utilization of a wasted hydrogen stream at an Engelhard Industries plant in Newark, New Jersey. In the proposed design the dc power output from the fuel cell is matched to the requirements of electrolytic silver-refining cells in the same plant. In the stack design and development effort of Task III, liquid-cooling was successfully applied in 12-cell stacks and in a nominal 5-KW stack. Average hydrogen-air cell performance in the 5-KW stack was lower than that obtained in prior 12-cell stacks, apparently due to lower quality bipolar plates. The bipolar plate study of Task IV identified certain formulations that warrant further investigation. These included both resin bonded graphite types and all-carbon types. Economic constraints were found to bear heavily on process feasibility for some formulations.

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION

23791 **(PB—83-136978) Energy future Santa Cruz. A citizens' plan for energy self-reliance: executive summary.** Cohn, J.; Stayton, R. (Resource Transitions, Inc., Santa Cruz, CA (USA)). 1982. 12p. NTIS, PC A02/MF A01.

A grassroots energy conservation project which involved more than 3100 residents of Santa Cruz, California, is discussed. Citizens attended forums and town meetings to suggest ideas for solving the community's energy problems. These ideas were then evaluated by the Energy Future Advisory Board and compiled into the Energy Future Plan. The plan covers such topics as new residences, residential retrofit, automobile efficiency, farm efficiency, commercial greenhouses, local food production, commercial efficiency, land use planning, energy education and financing, and solar, wind, and ocean energy. If the plan is successfully implemented, the energy that the community is projected to use in 1991 can be lowered by 24 to 35 percent.

23792 **(PB—83-142547) Energy efficiency: the impact of conservation.** (National Academy of Sciences - National Research Council, Washington, DC (USA)). 1981. 50p. NTIS, PC A03/MF A01.

The codified experience with conservation indicates that projection of energy needs may be much too high and that the United States has far more freedom to choose energy sources than has been perceived. There has been speculation that as the United States creates, develops, and implements new methods of conservation, it becomes conceivable that this country can eliminate its need for imported oil. This is the report of an Academy Forum on energy efficiency that focuses on the impact of conservation.

3201 Buildings

REFER ALSO TO CITATION(S) 23001, 23318, 23704, 23704, 23706, 23758

23793 **(ANL/EES-TM—207-Vol.1) Residential fuel comparison patterns for poor, black, and elderly households: a comparative study. Vol I. Data base development.** Poyer, D.; Teotia, A. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 83p. NTIS, PC A05/MF A01. Order Number DE83008636.

Energy consumption data (for 1979) are presented for three target population catgories - poor, black, and elderly - and the nation as a whole. The data give information on energy consumption for the three population categories and the nation at different levels of detail. For black households, contrary to what would be expected on the basic of the income effect alone, the average annual level of energy consumption was higher than the US average.

23794 **(ANL/NESC—782) DOE2.1A; building energy consumption analysis.** Hirsch, J.J. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048782.

The LOADS program allows the user to configure an arbitrary structure composed of walls, roofs, doors, windows, floors, ceilings, and thermal spaces. The user can specify scheduled occupancy, lighting, electric, and equipment loads in each space.

DOE2 is a set of computer programs for the analysis of energy consumption in buildings. Programs are included to calculate the heating and cooling loads for each space (zone) in the building for each hour of a year (LOADS), to simulate the operation and response of the equipment and systems that control temperature and humidity and distribute heating and cooling to the space (SYSTEMS), to model primary energy conversion equipment that uses fuel (e.g. oil, gas, or sun) to provide the required heating, cooling, and electricity (PLANT), and to compute the life-cycle cost for building operation based on economic parameters (ECONOMICS).CDC7600,6600,CYBER175;IBM370,303x;DEC10,20; FORTRAN (99.9%) and COMPASS (0.1%) for the CDC version. The IBM and DEC versions are all FORTRAN.; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175), OS/370 (IBM3033,370) and TOPS-10 (DEC10); The CDC version of DOE2.1A requires 142,000 (octal) words of program storage for execution of the sample problems. The IBM version of DOE2.1A requires 1362K bytes of memory. The DEC10 version of DOE2.1A requires 450K words of memory.

23795 **(ANL/NESC—949) BECOM-BNL; buildings energy optimization model.** Kleeman, P.T. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048949.

BECOM-BNL can model 25 energy conversion technologies and 8 structural technologies that can be used by 9 building types in each of 4 regions, and 72 separate building markets; 27 supply and 22 demand categories are included.

BECOM-BNL, the Brookhaven Buildings Energy Conservation Optimization Model, is a linear programming representation of energy use in buildings. Starting with engineering and economic data on cost and performance of energy technologies used in buildings, including both conversion devices (such as heat pumps) and structural improvements, the model constructs alternative flows for energy through the technologies to meet demands for space heating, air conditioning, thermal applications, and electric lighting and appliances. Alternative paths have different costs and efficiencies. Within constraints such as total demand for energy services, retirement of existing buildings, seasonal operation of certain devices, and others, the model calculates an optimal configuration of energy technologies in buildings.CDC7600; PDS; SCOPE 2.1; 160,000 (octal) words of SCM (small core memory) and 140,000 (octal) words of LCM (large core memory) were required to run the sample problem..

23796 **(BMFT-FB-T—79-101) Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses.** Wagner, H.J.; Turowski, R. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 29p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750326.

In the evaluation of energy supply technologies criteria such as economic competitiveness, environmental impact and ease of use are taken into account. A further point for evaluation is the energy economy of a system. This criterium compares the energy output of a system with the energy required for its installation and operation. The methods of the process chain analysis and the systematics of input-output tables permit the evaluation of the net energy production. Applying these methods the following three technologies for saving of heating fuel in a dwelling are compared: Solar systems (three types of system), heat pump systems (two types of system), improvement of insulation. It is found that the energy amortization period for insulation improvement (ca. 2 months), for heat pump systems (5-14 months) and for solar systems (16-23 months) is much

shorther than the anticipated life expectancy of the systems. From the point of view of energy economy it follows that even with accelerated market introduction there is no restriction for the market introduction rate.

23797 **(BMFT-FB-T—80-052) Investigation of the economic possibilities regarding the reduction of energy intensity for electrical household appliances. Vol. 1.** Orth, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 194p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750355.

Portions are illegible in microfiche products.

Investigation results concerning the analysis of the energy application for electrical household appliances have not been available up to now. The investigation had the purpose of analysing the energy consumption of energy-intensive household appliances so that energy conservation possibilities with regard to the effectiveness may be developed. The parts of the effective and of the lost energy are being experimentally determined for the following appliances: large-scale hot water tank, washing machine, laundry drier, dish washer, electric hearth, coolers and refrigerators. The influence of the utilization habits on the specific energy consumption and the relationship between the energy application and the application properties are being investigated. On the basis of the investigation results the different possibilities of energy conservation are shown, together with some aspects of economical operation. On the basis of the investigation results also, the potential of the energy conservation, related to practical consumption values, is estimated at about 5-40%, depending on the appliance.

23798 **(BMFT-FB-T—80-067) Insulation of exterior walls, placement of radiators and room climate.** Kuenzel, H.; Mayer, E. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 26p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750352.

The predominant view that radiators have to be placed near windows for reasons of comfort was closely examined at the testing site Holzkirchen of the Institut fuer Bauphysik. In the case of windows which are not airtight, correct placement of radiators is essential for comfort. Whereas radiators placed near windows show only an insignificant vertical temperature gradient and cause almost no air movement the corresponding values are uncomfortably high if radiators are placed along the opposite inside wall. The uncomfortable effect is primarily due to cold air seeping in from the outside. The effect of the air cooling off at the windowpane and falling to the floor of the room is almost negligible by comparison. The placement of radiators in rooms having well sealed windows, as they are required and built today, can be approached in a more flexible way. Especially in older buildings, the installation of radiators along the interior walls can lead to a reduction of heating energy consumption as well as installation costs.

23799 **(BMFT-FB-T—80-070) Window and its heat balance considering solar radiation and additional insulation measures.** Kuenzel, H.; Snatzke, C. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 27p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750353.

Loss of heat through windows during the night can be reduced by means of roller blinds or tightly closing folding shutters and adequately fixed curtains. Tests carried out with a common wooden framed window with clear-glass double glazing have proved that the measures mentioned above have improved the heat transmission coefficient ksub(F) = 3,0 W/m²K as follows: tightly closing curtain to 2,2 W/m²K, tightly closing roller blind and/or folding shutters to 1,9 W/m²K, curtain and blinds simultaneously to 1,5 W/m²K. During daytime remarkable gains of heat are obtained from solar radiation through windows. In a south orientated test room (percentage of surface - window 35%, glass 23% of the exterior wall surface) an average gain of heat of about 50% of the room's heat requirement for 12 daytime periods from 7 a.m. to 7 p.m. was stated under medium winter conditions. Taking into consideration day- and nighttime of the 12-day test period, more than 30% of heating capacity were saved. The threshold value of solar radiation, when gain of heat was equal to loss of heat, was found for the tested exterior wall surface at about 200 W/m² and for the clear-glass double glazing at just 100 W/m², the difference of temperature between room air and outside air being 20 K. These results obtained under winter conditions prove that in practice the window is not as bad from the thermal point of view as it seems when only the heat transmission coefficient ksub(F) is regarded. It is true that the above mentioned figures can only be applied to conditions prevailing in the test rooms, however based on these results it can be generally stated that the heat balance of the window is favourably influenced by solar radiation - especially through south windows - as well as by adequate insulation measures during the night (blinds, curtains).

23800 **(BMFT-FB-T—80-072) Heat energy consumption and intermittent heating.** Koenig, N.; Kupke, C. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Aug 1980. 55p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750348.

Portions are illegible in microfiche products.

It is possible to investigate by test methods in rooms with a different heat storage capacity and different heating systems or heating appliances, at what scale a decrease of the heat energy consumption is possible when using an intermittent heating mode as compared to a continuous heating mode. The work's aim was to show this effect quantitatively via experimental and theoretical investigations. The savings of energy by an intermittent heating mode amount to 10%-35% (light construction of the walls). In an ordinary house, where rooms are used for 16 hours, savings up to 10% can still be achieved. Use of electronic control systems in heating plants is discussed.

23801 **(BMFT-FB-T—80-075) Connection between air permeability of joints of windows and exchange of air in the room.** Holz, D. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 29p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750354.

The coefficient of air permeability of joints designates the tightness of windows and doors and is found out by means of a laboratory test. Air transmittance through a window or a door can be calculated from air permeability of joints and the given difference of pressure. This difference of pressure depends on the wind situation and on the shape of the building which is decisive for the air flow around. The connection in practice between wind situation, the air permeability of joints of a window and the exchange of air in the adjacent room is to be dealt with in orientating investigations. The results can be summarized and judged as follows: The air permeability of joints of wooden windows is subject to seasonal variations. Generally speaking, the air permeability of joints of windows cannot be considered to be a constant unchangeable value. With arriving wind flow, pressure conditions at the exterior side of a building depend on the wind velocity and on the arrangement of the building as well as on the amount of buildings in the neighbourhood. The connections are complex to a degree that predetermination of pressure conditions is not possible. Therefore, the air permeability of joints of windows and the wind velocity are insufficient characteristic values to make conclusive statements on exchange of air in rooms or buildings. Windows and doors of a building should be as tight as possible. The necessary ventilation should be carried out by special ventilation devices whose tightness and/or rate of ventilation can be regulated and thus adapted to hygienic requirements and wind conditions.

23802 **(BMFT-FB-T—80-125) Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump).** Wissler, K. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 61p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750373.

Portions are illegible in microfiche products.

In comparison to a boiler furnace, the energy consumption for house heating can be reduced by one half using heat pumps, driven by combustion engines. For economical operation of such a unit, however, low priced unit components with high durability, good efficiency and little service requirements have to be made available. This project was to develop a natural gas rotary engine

as a drive unit for a heat pump with 120-150 kW heating performance. By reason of price the engine was derived from an automotive prototype engine; it had an output of 50 kW at 6000 rpm. By an increased compression ratio and a rotor recess suitable for natural gas operation the efficiency has been improved. Especially developed spark plugs and the application of high performance lubrication oil resulted in extended service intervals. For the high lifetime required, the trochoid surface and the side housing surface were provided with a plasma spray wear coating, ceramic apex seals were used and the accessories were redesigned. During the endurance test a running time of 5500 h was reached. A further development of the engine was discontinued, since the automotive engine did not go into production and therefore the basis for a low priced manufacturing of the main engine parts was withdrawn.

23803 **(BMFT-FB-T—80-143) Energy conservation by gas-fulled heat pumps for hot water space heating systems.** van Heyden, L.; Evertz, E. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 227p. (In German). NTIS (US Sales Only), PC A11/MF A01. Order Number DE83750371.

Portions are illegible in microfiche products.

The objective of the project sponsored was the development of compression-type air/water heat pumps for space heating systems rated 20 to 150 kW. The heat pump was to be driven by reciprocating piston or rotary piston gas engines. Particular features of gas engine prime movers such as waste heat recovery and variable speed, were among the more important details to be studied. Two test rigs were built for the project. Two systems suitable for heat pump operation were selected from five different mass-production car engine and reciprocating piston compressor pairs. The refrigerants used were R 12 and R 22. Test rig data transferred to field conditions show that the fuel consumption of conventional boilers can be reduced by 50% and more by the installation of gas engine driven heat pumps. Pilot heat pumps based on a 1,600 cc reciprocating piston engine were built for heating four two-family houses. Pilot pumps were designed for two other applications. Apart from the development work of compression-type heat pumps, the life of rotary piston and reciprocating piston engines was investigated. The tests made to look into the characteristic curves of reciprocating piston engines and exhaust composition measurements are also discussed.

23804 **(DOE/CS/30254—5) Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982.** Arumi-Noe, F. (Texas Univ., Austin (USA). School of Architecture). Nov 1982. Contract AC02-80CS30254. 206p. NTIS, PC A10/MF A01. Order Number DE83008114.

Portions are illegible in microfiche products.

A summary of project activities, a list of the project publications, and complete copies of four of these publications are included. Separate abstracts were prepared for the four publications. (MHR)

23805 (DOE/CS/30254—5, pp 22p, Paper 1) **Thermal network solution of the DEROB program.** Nov 1982. NTIS, PC A10/MF A01. Order Number DE83008114.

Portions are illegible in microfiche products.

In Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982.

The DEROB thermal model is a thermal network. The program determines the number and physical position of each node given the building details, suitably abstracted for simulation. For each of the N nodes in the simulation an algebraic equation can be written to solve for the temperature of each node. The end result is a set of N equations in N unknowns. Much of the DRBTL4 program is devoted to the calculation of the coupling coefficients and the external source temperature. The solution section of the program is devoted to the solution of these simultaneous equations.

23806 (DOE/CS/30254—5, pp 32p, Paper 2) **Theory of the geometric algorithm of the DEROB program.** Nov 1982. NTIS, PC A10/MF A01. Order Number DE83008114.

Portions are illegible in microfiche products.

In Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982.

More accurate and efficient algorithms to calculate geometric factors and obstruction logic were developed, programmed and tested. These new algorithms were needed in order to facilitate the incorporation of lighting, both natural and artificial, into the DEROB System. With this new set of algorithms it will be possible to hard-wire, with minimum user involvement, the highly desirable capability of calculating light propagation via light shafts, courtyards and other multispace radiation coupling problems. This capability will include as a special case, the simple one room illumination analysis. The basic theory for these algorithms, and the listing of the DRBGF module that has them incorporated are presented. The completed incorporation of diffuse lighting into DEROB is expected to be completed by September 1981.

23807 (DOE/CS/30254—5, pp 104p, Paper 3) **Preliminary daylighting studies for incorporation into DEROB.** Nov 1982. NTIS, PC A10/MF A01. Order Number DE83008114.

Portions are illegible in microfiche products.

In Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982.

The daylighting sky factors have been calculated for an arbitrary point. The point represents a light meter that can be located anywhere in the simulated structure, and it can be oriented in any direction desired. It reads the sky factor and it can disagragate the first incidence component from the contributions due to reflections from surfaces, and transmissions from other spaces. The reflected and transmitted components-show a marked spatial dependence. The results are compared with standard calculation methods. These standard calculation methods are not capable of discerning the spatial dependence, and they have no capability to account for transmissions from other spaces. The fact that DEROB can describe in detail multispatial interactions allows it to calculate the effect of light-wells, courtyards, solariums on the illumination pattern of simulated spaces. A description of the results of the first set of comparisons, as well as the mathematical theory for multispace coupling, is included.

23808 (DOE/CS/30254—5, pp 41p, Paper 4) **Outline of a ventilation computer model for possible incorporation into DEROB.** Nov 1982. NTIS, PC A10/MF A01. Order Number DE83008114.

Portions are illegible in microfiche products.

In Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982.

The fluid-dynamics basis of the model is presented. The following are included: the symmetry of the resistance terms, the antisymmetry of the pressure terms, the loop-node coupling matrix, the resistance coupling matrix, the admittance matrix, types of nodes, pressure drop terms, pressure drops by connection types, the thermal solution, a model for the relaxation rate, units for input and output quantities, input sequence, examples, list of subroutines, and sequence of subroutine calls. (MHR)

23809 **(DOE/CS/64007—T1) Energy conservation in Maryland public schools. Analysis of 1982 data in relation to the 1978-81 study.** (Unified Industries, Inc., Springfield, VA (USA)). 11 Mar 1983. Contract AC01-80CS64007. 34p. NTIS, PC A03/MF A01. Order Number DE83008770.

The analysis of Maryland schools energy use data through 1981 (dated September 10, 1982) indicated that schools that participated in the Institutional Conservation Program (ICP) did no better in saving energy than schools that did not participate. Indeed in the year following receipt of ICP energy conservation measure (ECM) grants, the energy use of schools that received the grants actually increased significantly. No variable perceptible in the data or in external data, such as weather records, could be found to explain this perverse finding. Accordingly, an additional year's data was analyzed to see if: (1) the perverse energy use records of the ECM buildings reversed themselves, (2) the ECM energy use pattern provided evidence that major energy savings that did not occur in the first year occurred in the second year after receipt of ECM grants, and (3) the savings accrued by other categories of ICP participants and nonparticipants continued during 1982. Buildings that initiated ECM's in 1981 (based on grants received in 1980) had achieved savings that exceeded those of all other categories of participants and nonparticipants by 1982. Because this finding reverses the results of analysis of data from 1978 to 1981, it is reasonable to con-

clude that during 1982 the benefits of ECM's approved in 1980 did not demonstrate their effects until 1982.

23810 (DOE/CS/64007—T3) Energy conservation in hospitals. Analysis of data for Maine and Ohio, 1978-1981. (Unified Industries, Inc., Springfield, VA (USA)). 11 Mar 1983. Contract AC01-80CS64007. 51p. NTIS, PC A04/MF A01. Order Number DE83008574.

Data are presented on energy use in 78 hospitals in Ohio from 1979 to 1981 and in 36 hospitals in Maine during the period 1978-1981. It also attempts to discern the intervening effects of participation by hospitals in the energy conservation programs established by the Title III Institutional Conservation Program (ICP) of the National Energy Conservation Policy Act. In both states, this analysis was possible because records of hospital energy use and other pertinent records were maintained by professionals who were interested in energy conservation. This recordkeeping activity formed an essential element of this study. The methodology followed here was straightforward. Numerous calculations of energy use and energy costs were made for buildings categorized by their level of participation or nonparticipation in the program. The calculations were then examined to determine if indications of trends could be found. Finally, energy savings, adjusted for climate, were examined, with the hypothesis that program participation would save more energy than nonparticipants.

23811 (DOE/CS/64007—T4) Energy conservation in Maryland public schools, 1978-1981. (Unified Industries, Inc., Springfield, VA (USA)). 10 Sep 1982. Contract AC01-80CS64007. 33p. NTIS, PC A03/MF A01. Order Number DE83008458.

The energy consumption of public schools in Maryland is reviewed. It is proved that energy consevation can produce very significant savings in schools. It is not possible to generalize these findings to the schools of the nation, but there is no known factor tht would indicate a systematic difference between energy conservation potential in Maryland and in other states. The Maryland data do not reflect any clear effect of the National Energy Conservation Policy Act (NECPA) Institutional Conservation Program (ICP) on energy conservation in Maryland schools. For schools that participated in the energy audit (EA) and the technical assistance (TA) phases, the percentage of energy saved was no more than for those schools that participated in the preliminary energy audit (PEA) phase. Compared to data for 1980, schools that participated in the energy conservation measure (ECM) phase in 1981 experienced a 7 percent increase in energy use; whereas, the schools participated in the PEA phase (or not at all) showed an 11 percent decline. For the same period of comparison, energy costs increased for all groups by 20 percent.

23812 (DOE/IG—122) Weatherization program in West Virginia. (Department of Energy, Washington, DC (USA). Office of Inspector General). 28 Jul 1980. 40p. TIC. Order Number DE83006320.

Report to the Secretary, Deputy Secretary.

This report shows that widespread mismanagement as well as possible embezzlement and other irregularities weakened the Department's Weatherization Program in West Virginia. A variety of purchasing irregularities, inventory discrepancies, and diversions of funds and materials were found. A general failure on the part of responsible agency officials to provide proper accounting for funds and materials was also found. Corrective recommendations are proposed. Comments on the draft report are appended. (PSB)

23813 (DOE/PE/70044—T6) Analysis of commercial energy-conservation data. Final report. (Hittman Associates, Inc., Columbia, MD (USA)). Apr 1982. Contract AC01-79PE70044. 86p. NTIS, PC A05/MF A01. Order Number DE82014298.

Portions are illegible in microfiche products.

Potential savings attributable to conservation actions which have actually been implemented in a sample of commercial buildings are analyzed. With emphasis on retail stores and offices, energy conservation actions are categorized in three ways: by end-use affected, by cost, and by building characteristic. Four end-use categories were considered: structure, lighting, space conditioning, and others. Three cost categories were considered: no cost (i.e., reduced operation), low cost, and high cost. Eight building characteristics were considered: size, age, ownership, type of utility metering, number of employees, business hours, geographical region, and year surveyed. Some of the most significant results are cited and the data are compiled. (MCW)

23814 (DOE/R5/10145—T1) Residential dryer-exhaust energy-reclamation demonstration project. Final report. Swing, D.M. (Dryermate Co., Xenia, OH (USA)). 1 Oct 1980. Contract FG02-79R510145. 25p. NTIS, PC A02/MF A01. Order Number DE83009159.

Portions are illegible in microfiche products.

The advantages and disadvantages of indoor venting of an ordinary residential clothes dryer were determined by actual in-home testing. The research conditions are described and results are given. Many of the participants found their homes more comfortable and their drying time shorter. (MHR)

23815 (DOE/R5/10322—2) Do-it-yourself home energy-saving techniques. 1981-82 annual technical progress report, September 25, 1981-June 30, 1982. Taylor, D.B.; Powers, B.; Benjamin, R.; Deininger, L. (Cleveland Public Schools, OH (USA). Dept. of Research and Analysis). Jan 1983. Contract FG02-81R510322. 85p. NTIS, PC A05/MF A01. Order Number DE83007667.

Portions are illegible in microfiche products.

The development and testing of an instructional unit and related instructional materials for eaching secondary school students techniques for making their homes as energy efficient as possible are described. The instructional unit and the plans for its implementation are included. (MHR)

23816 (DOE/SF/11510—T1) Wind-tunnel research of flowfields within naturally ventilated rooms of simple geometry. Poreh, M.; Cermak, J.E.; Peterka, J.A. (Colorado State Univ., Fort Collins (USA). Fluid Dynamics and Diffusion Lab.). Sep 1982. Contract AC03-80SF11510. 64p. NTIS, PC A04/MF A01. Order Number DE83008110.

The study described consisted of wind-tunnel experiments to determine the flowfield created within a box-like structure containing two windows. Three configurations of the structure were investigated. The pressure distributions on the closed windows and the pressure at the same locations with open windows were measured and related to the approach flow. The mean air speed and the turbulence intensities near the windows and at various locations inside the rooms were measured using an omni-directional hot-film probe and a vertical, cylindrical hot-film probe. The air speed inside the room and at the windows was related to the approach flow and the pressures on the closed windows. Flow visualization using smoke and cotton tufts was used to study the flow patterns and the direction of the air flow at various locations inside each structure. Black and white photographs showing the basic features of the flow are presented.

23817 (Juel-Spez—65) Low-temperature heat supply with special consideration to a variety of new technologies. Orth, D. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Programmgruppe Systemforschung und Technologische Entwicklung). Dec 1979. 184p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83750370.

Portions are illegible in microfiche products.

Proceeding from an analysis of the low temperature heat demand in the FRG, various heating systems are chosen for comparison. The following systems are analysed in detail: conventional systems, heat pumps, solar systems, total energy systems. The working conditions for the heating systems are given for the following 3 house types: single family house, two-family house, and multi-family house. For comparison a typical structure of dwellings is defined. This corresponds to the average house type and heating system constructed in the years 1976/77. With these data a comparison between today's energy supply and a supply with alternative systems is possible. Criteria for comparison are technical, economical and ecological.

23818 (LBL—14251) **Residential demand for energy: a time-series and cross-sectional analysis for eight OECD countries.** Chern, W.S.; Ketoff, A.; Schipper, L.; Rosse, J.S. (Lawrence Berkeley Lab., CA (USA)). Jan 1983. Contract AC03-76SF00098. 79p. NTIS, PC A05/MF A01. Order Number DE83008650.

The purpose of this study is to develop an econometric model of residential energy demand at the end-use level for the eight countries in the Organization of Economic Cooperation and Development (OECD). A multinomial logit model was developed and estimated for the total residential demand and the space heating component. The model consists of an aggregate demand equation and a set of fuel share equations. Annual data for selected years during 1960 to 1979 from eight countries are pooled for estimation. The statistical results show that energy price, income, heating degree days, house size, and the saturation of central heating are important determinants for total residential demand and its space heating component. In other words, the differences in residential energy use patterns among the eight OECD countries can be explained by the differences in these structural variables. Four sets of energy demand elasticities were computed from the model's estimates. The estimates of the overall price elasticity are -0.513 and -0.356 for the total residential demand and space heating demand, respectively. The corresponding estimates of income elasticity are 0.771 and 0.465. The other fuel share elasticities and conventional fuel demand elasticities were also computed and presented in the report.

23819 (LBL—15199) **Lighting-electromagnetic compatibility conference: proceedings.** Verderber, R.R.; Berman, S.M. (eds.). (Lawrence Berkeley Lab., CA (USA)). Sep 1982. Contract AC03-76SF00098. 112p. (CONF-8203100—). NTIS, PC A06/MF A01. Order Number DE83005707.

From Light-electromagnetic compatibility conference; Berkeley, CA, USA (18 Mar 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Separate abstracts were prepared for five papers. Short summaries of discussions are included. (MHR)

23820 (LBL—15199, pp 9-23) **Biological effects of radio-frequency radiation.** Sheppard, A.R. (Veterans Administration Medical Center, Loma Linda, CA); Pettis, J.L. Sep 1982. NTIS, PC A06/MF A01. Order Number DE83005707.

From Light-electromagnetic compatibility conference; Berkeley, CA, USA (18 Mar 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The electromagnetic radiation from proposed new lighting systems falls into a portion of the spectrum of non-ionizing radiations (NIRs) that has been little explored. NIR bioeffects research has moved from an initial interest only in the heat effects to a consideration of non-thermal interactions, particularly those related to modulated or pulsed rf waves. Worldwide standards for NIR in the range of 10 MHz to 300 GHz are reviewed along with the underlying biophysical principles. Philosophies of standards-setting are discussed. The bioeffects literature is briefly reviewed in order to indicate some current research trends. It is suggested that the weak fields associated with EMI from lighting sources would be a biological concern only if non-thermal interactions at very low levels prove important.

23821 (LBL—15199, pp 24-34) **Reduction of AM radio interference through control of radiated electric field.** Roberts, V.D. (General Electric Co., Schenectady, NY). Sep 1982. NTIS, PC A06/MF A01. Order Number DE83005707.

From Light-electromagnetic compatibility conference; Berkeley, CA, USA (18 Mar 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The control of electromagnetic interference is becoming an increasing important aspect of electronic product design. For residential applications, interference with AM radios is of particular concern. Interference control activities in the AM band have traditionally centered on magnetic (H) field radiation since the FCC does not limit the E field radiation below 18 MHz, and it has been assumed that AM radios using ferrite rod antennas are H field receivers. During this study, it was determined that the E field sensitivity of some AM radios is approximately equal to their H field sensitivity. It was also determined that one particular electronically ballasted lamp design could be made interference free by controlling both E and H field radiation. An effective E field shield is described which does not require connection to the power supply ground.

23822 (LBL—15199, pp 35-52) **Electrical system waveform distortion.** Goodman, J.P. (David Taylor Naval Ship R and D Center, Annapolis, MD). Sep 1982. NTIS, PC A06/MF A01. Order Number DE83005707.

From Light-electromagnetic compatibility conference; Berkeley, CA, USA (18 Mar 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Interaction phenomena between electric power sources and system loads can result in poor power quality for sensitive electronic equipment. The paper discusses load linearity, power system source impedance, typical problem loads and approaches to restoring electric power quality. Although the discussion is primarily on naval shipboard power systems the theory also is applicable to commercial power systems and equipment.

23823 (LBL—15199, pp 53-73) **Conducted and radiated signatures of fluorescent lamp systems in C and I environments.** Javidi, S. (General Electric Co., East Cleveland, OH). Sep 1982. NTIS, PC A06/MF A01. Order Number DE83005707.

From Light-electromagnetic compatibility conference; Berkeley, CA, USA (18 Mar 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The power-line conducted EMI and radiated EMI generated by four samples of electronic fluorescent ballasts, and four samples of electromagnetic ballasts are presented. Conducted and radiated test protocols are given for these experiments. Proposed FCC limits under Part 18 of Rules and Regulations are compared to the EMI levels of the test samples.

23824 (LBL—15199, pp 74-95) **EMI measurements of lighting systems.** Arthur, A.; Leung, L.; Verderber, R. (Lawrence Berkeley Lab., CA). Sep 1982. NTIS, PC A06/MF A01. Order Number DE83005707.

From Light-electromagnetic compatibility conference; Berkeley, CA, USA (18 Mar 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Electromagnetic interference (EMI) measurements were made on several types of gas-discharge lamps operated at 60 Hz and at high frequency. Electric and magnetic field data were collected to determine the near-field impedance (1 to 4 kHz). The radiated E field at one meter from the lamps was 1 to 10 volts per meter. H fields were measured at 1 milliamp per meter. On-site EMI measurements from an installation of 140 solid-state ballasts operating lamps at high frequency show radiated and conducted levels that are about the same magnitude as those produced by a single solid-state ballasted system.

23825 (NYSERDA—82-33) **Occupancy-controlled lighting: energy-savings demonstration and analysis.** (Tishman Research Corp., New York (USA)). May 1982. 75p. NTIS, PC A04/MF A01. Order Number DE83901881.

Portions are illegible in microfiche products.

An energy analysis program evaluates the application of automatic occupancy-controlled light switching in two office buildings in New York City. These are the World Trade Center and the Rudin Management offices. The program evaluated energy savings, demand savings, cost savings, effect on total energy consumption equipment performance and user reaction. The devices used were pre-production developmental prototypes comprised of an infrared motion detector and control circuits designed to activate an external relay which switches lights off when it fails to sense a person in the space. The sensor measures both motion and infrared radiation

emitted by a body and uses time delay. Substantial energy savings are reported for the lighting system, but the effect on the heating/cooling system energy consumption was found to be negligible. (LEW)

23826 **(PB—83-145433) Self-help energy conservation programs for low-income groups: the SMILE experience.** Bachman, A.L. (Saint Martin, Iberia, Lafayette Community Action Agency, Inc., LA (USA)). May 1980. 25p. NTIS, PC A02/MF A01.

The implementation of a pilot program of self-help energy conservation projects in low-income neighborhoods in Lafayette, Louisiana, is described. The program was designed to meet the needs of a specific group of people within the context of their particular energy use patterns, their housing stock, and the climate of the southcentral region. A wider application is indicated, however, and the report focuses on those elements of the program that could be applied in other regions. Special attention is devoted to weatherproofing, and an informational booklet on this topic is included.

23827 **(SERI/TP—254-1801) Solar Energy Research Institute's daylighting laboratory.** Robbins, C.L.; Hunter, K.C. (Solar Energy Research Inst., Golden, CO (USA)). Mar 1983. Contract AC02-77CH00178. 11p. NTIS, PC A02/MF A001. Order Number DE83008468.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The use of daylighting can significantly reduce the energy consumption, cooling load, and peak demand in buildings. However, this reduction can occur only if daylighting is applied efficiently. This requires an understanding of both the fundamentals and the appropriate applications of daylighting. The daylighting laboratory of the Solar Energy Research Institute (SERI) was formed to study daylighting theory and application as it relates to the particular climates and needs of the United States. The laboratory studies the daylighting resources of the United States and the effective integration of daylighting in buildings. An overview of the activities and facilities of the laboratory is presented.

23828 **(SERI/TP—254-1802) Wind data for building ventilation in selected US cities.** Robbins, C.L.; Hunter, K.C. (Solar Energy Research Inst., Golden, CO (USA)). Mar 1983. Contract AC02-77CH00178. 19p. (CONF-821213—5). NTIS, PC A02/MF A01. Order Number DE83009182.

From 5. international conference on alternative energy source; Miami Beach, FL, USA (13 Dec 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Appropriately using natural ventilation in a building can play a significant role in reducing the building's energy consumption. However, without accurate wind velocity and direction data the designer has no chance of incorporating natural ventilation. Wind data generated for 80 cities in the United States are documented. The source and methodology for generating the data, and an example of an application are presented. The data include average and mean hourly wind speed and direction, annual bin wind data, and monthly bin wind data. The data were derived from the hourly wind speed and direction measurements contained on the Typical Meteorological Year (TMY) and Estimated Typical Meteorological Year (ETMY) weather tapes. Prior to this work data were available from the National Oceanic and Atmospheric Administration (NOAA) only in three-hourly interval data, monthly summaries, yearly summaries, and averages. The new data make it possible to perform rigorous hourly simulations for a building.

23829 **Energy use guidelines for public/nonprofit buildings.** Hirst, E. (Oak Ridge Natl Lab, TN, USA). *Consulting Engineer (Barrington, Illinois);* **58**: No. 3, 85-88(Mar 1982).

The Institutional Conservation Program, created by the 1978 National Energy Conservation Policy Act, aims to collect basic information on eligible buildings for the purpose of designing energy conservation programs, comparing results of similar buildings, and forecasting sector energy consumption. Information was collected on almost 15,000 buildings in 10 states, along with computer programs relating to such information. There are strong regional differences in the types of fuels consumed, and energy use depends strongly on building function. No single variable adequately explains differences in energy use among buildings.

23830 **Odor control through ventilation: smoking vs. nonsmoking occupancy. Paper 81.22.5.** Cain, W.S.; Leaderer, B.P.; Isseroff, R.; Huey, R.J. (John B. Pierce Found Lab, New Haven, CT, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

An environmental chamber was used for the exploration of ventilation requirements to control occupancy odor and other contaminants, such as tobacco smoke. The results are plotted in numerous graphs with a summary of an evaluation by both persons that took part in the survey and instruments. 9 refs.

23831 **Tobacco smoke in occupied spaces: ventilation requirements. Paper 81.22.4.** Leaderer, B.P.; Cain, W.S.; Isseroff, R.; Berglund, L.G. (Yale Univ Sch of Med, New Haven, CT, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

This paper presents results of experiments conducted in an aluminum-lined environmental chamber to assess the concentrations of chemicals generated by the combustion of tobacco. The experiments explored steady state concentrations of carbon monoxide and total suspended particulate matter, as factor of the smoking rates and ventilation. 14 refs.

23832 **Impact of energy-conserv retrofits on indoor air quality in residential housing. Paper 81.22.1.** Berk, J.V.; Young, R.A.; Brown, S.R.; Hollowell, C.D. (Univ of Calif, Berkeley, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

A mobile laboratory was used to make detailed on-site measurements of air exchange rate and concentrations of radon, formaldehyde, total aldehydes, particulates, carbon dioxide, carbon monoxide, nitrogen dioxide, nitric oxide, ozone, and sulfur dioxide in two houses and effective leakage area measurements were made in seven others. Results from the nine houses studied here show that the impact of energy-conserving retrofits depends on (1) the type and extent of the retrofit, (2) the operating characteristics of the heating/cooling system, and (3) the activities of the occupants. 7 refs.

23833 **Odor acceptability in the indoor environment. Paper 81.22.3.** Flesh, R.D.; Riha, M.L.; Duffee, R.A. (Del Green Assoc Inc, San Diego, CA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

Results of a study are presented which was conducted in order to determine the maximum reduction in ventilation rates possible to reach acceptable levels of odor in public buildings. Relationships between ventilation rates and odor levels have been established. Perceptual evaluations were made by occupants and visitors. 1 ref.

23834 **Heat transfer in building thermal insulation: the thickness effect.** Fine, H.A.; Jury, S.H.; Yarbrough, D.W.; McElroy, D.L. (Univ of Ky, Lexington, USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **87**: 89-107(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

(1) The measurement of the apparent thermal properties (i.e., conductivity, resistivity, and resistance) of insulation of the guarded hot-plate technique is modeled using a digital computer that solves the coupled conductive and radiative heat transfer problem for an absorbing and emitting single-phase gray medium contained between parallel black isothermal plates. The results of these calculations for the worst limiting case and the previously determined re-

sults for the best limiting case are used to bracket the effect of sample thickness on the apparent thermal properties of insulation and to develop an extrapolation equation that shows the relationship between the apparent thermal properties and the measurement conditions (e.g., hot- and cold-plate emissivities and temperatures and specimen thickness). 16 refs.

23835 **Thermal room models for control analysis.** Borresen, B.A. (Norw Inst of Technol, Trondheim). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* 87: 251-261(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

The analysis of a dynamic control loop often requires the use of a room model. Four simplified dynamic room models are discussed which in different ways take into account the thermal interaction between room air and surrounding walls. The room air is assumed to be fully mixed. It is shown that the choice of the simplified level employed depends on how closely the long-term responses and steady-state values are to fit the actual room response. For modeling short-term dynamic responses, a simple time constant corresponding to the air change rate of the room is usually adequate and will lead to choosing conservative control parameters. An experimental procedure for determining typical parameter values is discussed. 6 refs.

23836 **Energy conservation evaluation of two variable interval time/temperature heat pump defrost control strategies.** Rettberg, R.J. (Sci Appl Inc, La Jolla, CA USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* 87: 435-448(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

The variable interval time/temperature (VITT) defrost control systems monitor outside air dry-bulb temperature and use the measured data to alter the interval between defrost. However, for any outdoor temperature, the VITT systems, defrost at constant intervals of time. Analyses of the VITT-A A and VITT-B strategies have been performed for the Department of Energy to assess the energy-saving potential of VITT defrost control sytems as compared to demand and fixed-interval time/temperature (FITT) defrost control systems. VITT defrost control strategies result in seasonal performance that is more energy efficient that that of FITT strategies and less energy efficient than that of demand defrost controls. 7 refs.

23837 **Analytical developments in interzone and system coupling methodology.** Cumali, Z.O.; Sullivan, R. (CCB/Cumali Assoc, Oakland, CA USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* 87: 539-544(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

An improved method used for analyzing interzone and system coupling phenomena in heat transfer processes has been documented. Basically, a reformulation of the basic algorithms enabled the generation of a simultaneous matrix solution for space temperatures. It is the ultimate aim of such research efforts to structure an interchangeable set of independent methods and calculation tools whereby the most appropriate approach might be applied to the problem at hand. Thus, a more exact modeling will ensure greater flexibility and precision in energy analysis and selection of design alternatives, whether for passive solar or for more conventional structures. 7 refs.

23838 **Generalized heating and cooling load models for seasonal performance calculation.** Dabiri, A.E.; Peterka, D.L. (Sci Appl Inc, La Jolla, CA USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* 87: 195-213(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

An attempt is made to improve the load modeling technique of the SPM cooling and heating load models in order to estimate a more realistic load for seasonal analysis calculations. The model developed was compared with an hourly simulation routine to investigate the accuracy of the model. The simiplified energy calculation procedure called HEAP (Home Energy Audit Program) is studied; many of the algorithms in the program are reconstructed; and the whole procedure given a new name, SPMLD (Seasonal Performance Model Load). The SPM load model and SPMLD results were compared with the use of a residential building. Fairly good agreement exists between SPMLD and Improved SPM results for both cooling and heating load calculations for a wide variety of heating and cooling degree days. 8 refs.

23839 **DOE test procedure setup measurement errors: part 1.** Tree, D.R.; Lamb, G.D. (Purdue Univ, West Lafayette, IN, USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* 87: 743-756(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

Test procedures associated with the cooling of the indoor air prescribed by the Department of Energy are discussed. Some possible sources of error in test set-ups are pointed out: room temperature fluctuations; the measuring equipment; radiation; response time; temperature sensor location; energy transfer into the duct; heat transfer effects; and thermal storage effects. Most of the errors are additive, so that small errors can add up quickly. 9 refs.

23840 **Effects of cyclic response of residential air conditioners on seasonal performance.** Goldschmidt, V.W. (Purdue Univ, West Lafayette, IN, USA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* 87: 757-770(1981). (CONF-810657—). Cincinnati, OH, USA (28 Jun 1981).

An attempt is made to estimate the effects of cyclic response on seasonal efficiency, based both on the actual field experiments and on the collected test data. An analysis of the relationship of the duty cycle to the weather, or to the load, is first needed. This relationship is implicit in the test procedure (through the choice of the on- and off-times) but has to be approximated differently for the field data. The cyclic effects are most noted for the cases of short on-time of the equipment. The equipment cyclic characteristics are defined by an equivalent time constant, /tau/e, defined as that constant of an idealized first-order system leading to the same part-load factor for the same on-time. With a defined duty cycle (and its dependence on weather and the capacity-to-load matching), system steady-state efficiencies, and a descriptive effective time constant, the seasonal performance can readily be determined. This is easily done through the weather bin method. 14 refs.

3202 Transportation

23841 **(ANL/CNSV-TM—108) Socio-technical scenarios for long-range transportation technology comparisons.** Millar, M. (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 33p. NTIS, PC A03/MF A01. Order Number DE83008634.

An overview is provided of eight socio-technical scenarios constructed for use in long-range technology forecasting and assessment efforts of the Department of Energy's Office of Vehicle and Engine Research and Development (OVERD). Discussions of the scenario-development process and the principal influences or drivers considered in that process, a description of the scenarios developed to date, and a comparison of the key features of those scenarios are included.

23842 **(ANL/EES-TM—211) Energy requirements for materials used in vehicles characterized for the TAPCUT project.** Hudson, C.L. (Hudson Associates, Santa Barbara, CA (USA)). Dec 1982. Contract W-31-109-ENG-38. 67p. NTIS, PC A04/MF A01. Order Number DE83008639.

The method and data used to estimate the energy required to produce each material used in the vehicles characterized for Argonne's Technology Assessment of Productive Conservation in Urban Transportation (TAPCUT) project are presented. The estimated energy requirements for material production are based both on reference data and on scenario-sensitive projections of material recycling rates, material import rates, production efficiency factors, and industrial fuel distributions. These data and projections are discussed. On the basis of these projections and the material distributions and weights of specific vehicles, the energy required to produce the specific vehicles characterized for the TAPCUT project may be generated.

23843 (CONF-820128—7) Forecasts of intercity passenger demand and energy use through 2000. Kaplan, M.P.; Vyas, A.D.; Millar, M.; Gur, Y. (Argonne National Lab., IL (USA); Urban Systems, Inc., Oak Park, IL (USA)). Jan 1982. Contract W-31-109-ENG-38. 30p. NTIS, PC A03/MF A01. Order Number DE83007640.

From 61. annual meeting of the Transportation Research Board; Washington, DC, USA (18 Jan 1982).

Portions are illegible in microfiche products.

The development of national travel demand and energy-use forecasts for automobile and common-carrier intercity travel through the year 2000. The forecasts are driven by the POINTS (Passenger Oriented Intercity Network Travel Simulation) model, a model direct-demand model which accounts for competition among modes and destinations. Developed and used to model SMSA-to-SMSA business and nonbusiness travel, POINTS is an improvement over earlier direct demand models because it includes an explicit representation of cities' relative accessibilities and a utility maximizing behavorial multimodal travel function. Within POINTS, path-building algorithms are used to determine city-pair travel times and costs by mode, including intramodal transfer times. Other input data include projections of SMSA population, public and private sector employment, and hotel and other retail receipts. Outputs include forecasts of SMSA-to-SMSA person trips and person-miles of travel by mode. For the national forecasts, these are expanded to represent all intercity travel (trips greater than 100 miles, one way) for two fuel-price cases. Under both cases rising fuel prices, accompanied by substantial reductions in model-energy intensities, result in moderate growth in total intercity passenger travel. Total intercity passenger travel is predicted to grow at approximately one percent per year, slightly fster than population growth, while air travel grows almost twice as fast as population. The net effect of moderate travel growth and substantial reduction in model energy intensities is a reduction of approximately 50 percent in fuel consumption by the intercity passenger travel market.

23844 (NCHRP—85) Energy involved in construction materials and procedures. Halstead, W.J. (National Research Council, Washington, DC (USA). Transportation Research Board). Dec 1981. 39p. Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave, NW, Washington, DC. Order Number DE83901397.

Various published energy requirements for highway construction and maintenance are reviewed, including the energy requirements for processing the materials and the fuel used in hauling and for construction equipment. Essentially all available data are estimates, usually based on averages for processes or materials that may vary significantly, depending on the circumstances and operating conditions. In most cases, subjective assumptions were made concerning process and equipment operation efficiencies that also may vary significantly among projects. It is emphasized that decisions concerning the use of alternative types of materials for highway construction and maintenance should be based on technological considerations, safety, and the cost effectiveness of alternatives rather than on uncertain estimates of energy requirements. The relative roles of construction energy, transport energy, processing energy, and calorific energy are discussed and are illustrated by computations of estimated requirements by different types of base courses and surfaces. The potential opportunities for energy conservation in various highway construction and maintenance activities are included. It is recommended that each of the four categories of energy discussed - transportation, construction, processing, and calorific - be computed separately and that each be taken into consideration in any decision concerning overall energy requirements for a given highway construction or maintenance project.

3203 Industry And Agriculture

REFER ALSO TO CITATION(S) 22944, 23000, 23038, 23289, 23700, 23887, 23975, 24023, 24054, 24106, 24157

23845 (AD-A—122408/8) Reliability engineering analysis - small-scale heat recovery incinerator installations (NS Mayport and NAS, Jacksonville). Final report. (VSE Corp., Oxnard, CA (USA)). Sep 1982. 66p. NTIS, PC A04/MF A01.

This report addresses the reliability prediction conducted on the two Navy owned and operated heat recovery incinerator systems. The prediction was based on a part counts methods and the original designs of the two HRI systems. Based on this prediction, long term data collected at Mayport and Jacksonville HRI systems and mission requirements, testing procedures for HRI systems have been identified. Included in this report is a failure modes and effects analysis conducted at these HRIs.

23846 (ANL-CT—80-3-Add.3) DOE/ANL/HTRI heat-exchanger-tube vibration data bank. Halle, H.; Chenoweth, J.M.; Wambsganss, M.W. (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 49p. NTIS, PC A03/MF A01. Order Number DE83008726.

The Heat Exchanger Tube Vibration Data Bank was established to accumulate comprehensive case histories on heat exchangers that have experienced tube vibration problems and on units that have been trouble free, and to render this information available for evaluation, improvement, and development of vibration prediction methods and design guidelines. Nine new case histories are presented. Tube damage was incurred in some cases by cutting at the baffles and/or failure near the tube sheets. There are examples of exchangers without vibration problems even though their designs were thought to be marginal with respect to flow-induced vibration. (LEW)

23847 (BMFT-FB-M—79-06) Investigation of water chemical effects resulting from the application of additivs in MSF-plants. Kupka, K.H.; Hirschfeld, D. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Jun 1978. 22p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750343.

Portions are illegible in microfiche products.

During the planning period, additives for scale prevention for the flash evaporator were tested. A device was developed in the Krupp's Research Institute that renders this testing applicable in practical use. In the same connection the influence of activated carbon on organic impurities in distillate was examined.

23848 (BMFT-FB-T—79-92) Fundamental study on the feasibility of waste heat utilization in households. Ebersbach, K.F.; Gossenberger, M.; Layer, G.T.; Poschenrieder, J.; Wegner, M. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 160p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750325.

Portions are illegible in microfiche products.

Utilization of waste heat in households is practicable mainly as heat recovery from waste water and from freezers and refrigerators. The heat recovered can be used for hot water preparing by means of a heat pump. Heat recovery from waste water can be done both by a centralized and decentralized equipment. Rather promising appears a centralized heat recovery for a whole house consisting of a heat pump system and a waste water and hot water tank. Increasing magnitude of the house leads to a diminishing of the specific tank volumes. The examination of the possibilities for the utilization of the heat content of waste water needs as a main-prerequisite reliable data on cold and hot water consumption as well as on waste water output and on the factors influencing these magnitudes. In particular the load characteristics of water demand and waste heat output have to be metered. For this purpose, during a period of several months, measurements had been carried out in houses of different magnitude. They resulted in showing us a typical depending of the consumption and of the demand characteristic on the respective day of the week. In comparison to conventional hot water preparing waste heat recovery leads to possible savings of final energy of about 50% and more. For a further minimizing of energy consumption and from the point of view of economy designs have to be found which need as little auxiliary and additional energy as possible.

23849 (BMFT-FB-T—79-95) Potential of organic residues for the production of basic chemical compounds. Pt. 1. Dauber, E.; Gampe, S.; Kreutzer, K.; Luger, F.; Zenke, B.; Glatz, E. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1978. 488p. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE83750321.

Portions are illegible in microfiche products.

An estimation of logging residues and thinning reserves was made by use of statistics and a prognosis of forest yield in Bavaria. Presently 30.6 million cubic meters of wood or 13.4 million tons are used in the Federal Republic of Germany. 9.9 million tons are estimated to be logging residues. Considering a minimum of ecological and silvicultural restrictions only 4.0 million tons will be available. 1.5 million tons thereof are bark residues which nowadays are removed with wood and manufactured partly in the corresponding industries. For small wood full tree utilization seems to be prosperous although costs are still very high (150-200 DM/ton). Generally speaking, the utilization of forest residues is still problematic for economical and technical reasons. Only by solving all these problems an amount of 5.1 million tons of forest residues may be available in the year of 2000.

23850 (BMFT-FB-T—79-96) Potential of organic residues for the production of basic chemical compounds. Pt. 2. Nock, H.P.; Stegmann, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 119p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750323.

Physical availability and possible use of residues from wood industries in the Federal Republic of Germany are presented. Recent and complete surveys and forecasts are presently not available. They are however necessary to improve existing recycling and to allow chemical utilization of still unused wood wastes. Based on inquiries in industries and associations, an analysis of the amount of residues produced and of their consumption by different industry branches and regions has been carried out. In 1976 about Mio m^3 residues were produsd, 46% of which were further utilized by the wood processing industry, 42% were used as energy source. From a production-consumption balance, a quantity of 1.7 Mio m^3 still unused residues (waste) has been determined for 1976. Recycling possibilities for these amounts were discussed under technical, economical and legal aspects. For chemical utilization, the conditions to use small and widely distributed amounts of partly contaminated wood wastes are not favourable. Forecasts of the availability of residues and waste up to 1990 complete the study, some medium- and longterm measures are recommended.

23851 (BMFT-FB-T—79-97) Potential of organic residues for the production of basic chemical compounds. Pt. 3. Gieseler, G.; Rauschenberger, H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1978. 90p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750324.

Portions are illegible in microfiche products.

Physical availability and utilization possibilities of wood residues emitted by industries (except for wood industry) agriculture and communities (municipal and bulky refuse) have been analyzed and specified according to type, quantity and distribution within the Laender of the Federal Republic of Germany (1.16 Mio t/a). Input/output analysis in production and consumption verified the national inquiries 1974/75. Transport costs will be investigated. Medium- and long-term measures shall improve the organization and have to be selected by indicators like costs.

23852 (BMFT-FB-T—79-98) Potential of organic residues for the production of basic chemical compounds. Gieseler, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 95p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750322.

Portions are illegible in microfiche products.

The availability of wood residues originated from forests, (wood) industries, agriculture and communities will be presented briefly (5.9 million tons in the next future). Based on these data, models of transport costs have been elaborated by making use of the transshipment possibilities via central municipal landfill. The potential of wood residues will be compared with the situation of basic need of chemicals. Medium- and long-term measures are defined briefly. The situation of wood resources (more than 10 million m^3p.a. production) in developing countries will be described in tabular form.

23853 (BMFT-FB-T—79-118) Study on an example of heat supply from waste heat. Ebert, G.; Simoneit, H.W. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Sep 1978. 173p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750332.

Portions are illegible in microfiche products.

A systematic and exemplary approach is taken on the problem of utilizing waste heat. Part 1 gives a general and basic abstract of the subject, refering to small and medium size sources of waste heat, not within favourable distances to interconnected systems and usable without heat pumps. The main characteristics of waste heat and the demand of potential consumer are shown as well as the technical, economic and legal aspects of the problem. Part 2 deals with the utilization of an existing source of waste heat. Based on the concrete data of the Ebenhausen refuse incineration plant near Ingolsstadt, a long-distance heating system supplied by waste heat is technically layed out and economically analysed.

23854 (BMFT-FB-T—80-114) Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump). Ruf, M.; Scheu, J. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Oct 1980. 42p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750364.

Portions are illegible in microfiche products.

In 1974, the development of rotary piston units for heat pumps was started at AUDI NSU in Neckarsulm. In this report, the rotary piston compressor as a partial volume of the program will be discussed. After extensive system analysis, a compressor with a nearly circular running surface (single lobe trochoid) was designed, in which a biangular piston rotates. The compressor was examined by several prototypes on the test bench for function and on a durability test bench and was further developed. Our measurements show that this rotary piston compressor design is superior to currently known reciprocating piston compressors in respect to efficiency, volumetric efficiency and operation behaviour. Compared to the present standard, the application for heat pump operation promises an obvious reduction of primary energy. At present, one compressor has reached 7.200 operating hours in the endurance test. All wear data are at such a low level, that a required total operation time of 20.000 hours can be reached or even be exceeded. AUDI NSU continues the development of this compressor according to plan. However, considerable expenses are necessary to develop this compressor type to the stage of mass production.

23855 (BMFT-FB-T—80-121) Development of an optimizing method for the design of pipe systems in the ground used as heat source for heat pumps. von Cube, H.L.; Ludwig, E.; Sattlegger, J.; Rohde, J. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Aug 1980. 317p. (In German). NTIS (US Sales Only), PC A14/MF A01. Order Number DE83750365.

Portions are illegible in microfiche products.

The topics discussed include: the collection of literature; physical values of the ground; systematic representation of the analytic calculation methods; development of a calculation method suitable for EDP-calculation with difference steps for space and time, which allows the representation of the isothermic lines and the calculation of heat flow to and from the ground as well as freezing processes by the solution of a two dimensional, linear operator according to Crank-Nicolson. The development of a program to optimize pipe systems in the ground is concerned with: laying method, dimensioning of pipe, and density of heat flow. Information on the optimal pipe system are given, i.e., optimal pipe diameter, heat flow density, laying distance, optimal laying depth, and pass-length.

23856 (CONF-810545—11) Economic evaluation of competing industrial waste-heat-recovery technologies. Grogan, P.J.; Brown, H.L.; Hamel, B.B. (Argonne National Lab., IL (USA); General Energy Associates, Cherry Hill, NJ (USA)). 1981. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83008744.

From 3. conference on waste heat management and utilization; Miami, FL, USA (12 May 1981).

The economics of conventional waste-heat-recovery technologies and fluidized-bed heat exchangers were analyzed according to their applications and potential market shares in the industrial sector. The performance parameters and costs of these technologies were based upon existing information. Data on available waste energy in industry, and the waste-heat temperatues, were based upon the Industrial Plant Energy Profile (IPEP). This model contains plant-energy information from approximately 400,000 industrial plant sites in the country. These sites represent the bulk of the US industrial manufacturing capacity. Based on this information, the available waste energy from each of the industrial sectors was determined by major unit operation. Each of the competing heat-recovery technologies, both conventional and fluidized-bed, was applied to the waste streams. Energy savings and payback periods were determined on the bases of waste-heat source and plant size. Conventional heat exchangers showed a singificant number of applications with paybacks of less than one year. The fluidized-bed systems had a limited number of such applications.

23857 (DOE/CE/40551—T1) Steel-mill-residue recycling processes: an energy and economic analysis. Project final report. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Jan 1983. Contract AC07-82CE40551. 120p. NTIS, PC A06/MF A01. Order Number DE83009195.

Portions are illegible in microfiche products.

Included in this analysis are an evaluation of conventional and non-conventional recycling processes, their technical and economic feasibility, and requirements for further development within the United States. This study considered a number of processes proposed by both domestic and international organizations. All of the processes studied produce a product for potential reuse in the steel industry. Estimates were made of the processing energy involved in treating the dusts and sludges, the energy associated with raw materials used in the processing of the dusts and sludges, the energy associated with transportation, and the energy required to convert the recycled material to molten pig iron. The summation of these energies was compared to a base case for energy consumption in the production of pig iron in a blast furnace from iron ore, coke, and limestone. By this methodology, a comparison was made of the potential energy savings of processing steel mill dusts and sludges and utilizing them to replace iron ore units.

23858 (DOE/CE/40583—T1) Thermionic cogeneration burner assessment study. First quarterly technical progress report, October-December, 1982. (Rasor Associates, Inc., Sunnyvale, CA (USA)). 1983. Contract AC02-82CE40583. 57p. NTIS, PC A04/MF A01. Order Number DE83008386.

Work during this period concentrated on the two areas considered to be important to the successful completion of this project: the performance analysis and the general industrial survey. The performance analysis is critical because it forms the basis of the cost analysis. The performance analysis work progressed with the completion of the analytical model of the burner and its partial incorporation into the program. The General Industrial Survey proceeded with a database search being performed on DOE's and NASA's data bases. Initial reviews of the Chlor-Alkali, Copper, Steel and Alumina/Aluminum industries were performed. The Copper and Chlor-Alkali industries appear attractive, with the Steel industry slightly less attractive in the initial analysis. The Alumina/Aluminum industry could be attractive if the two plants were located near each other.

23859 (DOE/CS/40312—2) Development of retrofitting modifications of textile-loom picking and lay mechanisms for reduction of energy consumption. Final report. (Lowell Univ., MA (USA)). Feb 1983. Contract AC02-80CS40312. 263p. NTIS MF A01. Order Number DE83009370.

Microfiche only, copy does not permit paper copy reproduction.

A retrofitting shuttle loom picking mechanism was designed, fabricated, installed and operated at a speed of 200 picks per minute. A detailed account of design criteria and research measurements is given. A reliable techniques for measuring the dynamic loads is described and the load of an air jet loom is compared with the loads of conventional shuttle loom. The reduction of energy consumption in a typical four bar linkage system was studied. (MHR)

23860 (DOE/ER/10645—10-Pt.2) General framework for the assessment of dynamic resilience. Part II. An application. Morari, M.; Oglesby, M.J.; Prosser, I.D. (Imperial Chemical Industries Ltd., Billingham (UK)). Feb 1982. Contract AC02-80ER10645. 16p. (CONF-821106—30-Pt.2). NTIS MF A01. Order Number DE83009119.

From Annual meeting of heat transfer and energy conversion (American Inst of Chemical Engineers); Los Angeles, CA, USA (14 Nov 1982).

Microfiche only, copy does not permit paper copy reproduction.

In previous parts of this series methods were developed for the design of plants which are not only optimal at some nominal operating point but which can also deal effectively with disturbances and changes in the operating conditions. These techniques are applied here to synthesize the heat exchanger network and the control structure for a sequence of two exothermic open-loop unstable continuous stirred tank reactors.

23861 (DOE/ID/12225—T2) Heat-exchanger needs for recovering waste heat in the glass-making industry. Final report. Webb, R.L.; Kulkarni, A.K. (Pennsylvania State Univ., University Park (USA). Dept. of Mechanical Engineering). Feb 1983. Contract FG07-81ID12225. 37p. NTIS, PC A03/MF A01. Order Number DE83009198.

Portions are illegible in microfiche products.

The state of the art of waste heat recovery technology in the glass-making industry is assessed. Fouling and corrosion glass furnace regenerators are reviewed. Heat recovery from the exhaust gases leaving the brick checkers regenerator of a soda lime glass furnace is addressed. Research and development needs that will advance the use of secondary heat recovery in the glass industry are identified. (LEW)

23862 (DOE/RA/50377—2) Cogeneration Energy Recovery Facility feasibility study: project summary. (Nashville Electric Service, TN (USA)). Feb 1983. Contract FG01-80RA50377. 69p. NTIS MF A01. Order Number DE83008482.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted.

The development of a cogeneration energy recovery facility to produce process steam for sale to industrial steam users is discussed. Particularly, the commercial viability study is summarized which presents the estimated project capital costs and the probable bond issue for bonded debt financing, the annual ownership operating the maintenance costs, and the annual project revenues. A life-cycle analysis has been performed with these costs and revenues for the anticipated 20 year financial commitment. These life-cycle analyses were performed for various assumed economic circumstances, and selected cases are presented. (LEW)

23863 (EPRI-EM—2886) Potential for cogeneration in distillation. Final report. Mix, T.W. (Merix Corp., Wellesley, MA (USA)). Feb 1983. 127p. NTIS, PC A07/MF A01. Order Number DE83901822.

Distillation represents a major consumer of energy in the United States and is a good sump for a cogeneration facility because it represents a condensing load. The potential for cogeneration in the distillation industries (chemical plants and oil refineries) is evaluated based on discussions with knowledgeable individuals in major chemical and petroleum refining companies, in architect/engineer firms and in utilities,as well as on a review of the literature. The total potential for cogeneration in that time frame in which the price of gas and oil escalates to three to four times the price of coal is estimated as ranging from 2600 to 3750 MW in the petroleum refining industry, is estimated as 900 MW in the electrochemical in-

dustry, and as 2440 MW in the remainder of the chemical industry. Gas turbine/waste heat boiler cogeneration systems are projected as being installed in California, gas turbine with combined cycle systems are seen as being installed in the electrochemical industry, and coal-fired back-pressure steam turbine cogeneration systems are seen as being installed in the remainder of the chemical and petroleum refinery installations. The Texas Gulf coast area is seen as having the largest potential for cogeneration, but significant potential exists in California as well. Coal is seen as the dominant cogeneration fuel and the average cogeneration plant size is projected as large, with over 500,000 labs/hr of steam flow and more than 50 MW cogenerated electric power.

23864 **(NP—3770031) Straw processing.** (Bayerische Landesanstalt fuer Landtechnik, Freising (Germany, F.R.)). 1978. 35p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83770031.

Portions are illegible in microfiche products.

In order to use straw as fodder, it must be chopped and processed, i.e. the lignin shield must be dissolved in order to set the cell contents, e.g. cellulose, free for consumption. This is done by chemical processes using soda lye, ammonia, or water vapour. Straw processing plants are described, and the efficiencies and costs of the various processes are compared. The use of straw as litter is discussed.

23865 **(PB—83-135574) Heat recovery by organic Rankine cycle in ceramics firing ovens. Final report.** Angelino, G.; Ferrari, P.; Gaia, M.; Giglioli, G.; Macchi, E. (Commission of the European Communities, Luxembourg). [nd]. 37p. NTIS, PC AE03/MF E03.

The process of ceramics firing, like many other high temperature processes, is inefficient but it is possible to recover an important fraction of the heat input. A recovery system is proposed which transforms the recovered heat into electricity by means of an organic Rankine cycle engine. A thermodynamic study has led to the selection of tetrachloroethylene as the working fluid, with a rated power output of 40 kW at the turbine shaft and an evaporation temperature of the working fluid of 110C.

23866 **Ceramic heat pipes for high-temperature heat recovery.** Strumpf, H.J. (AiResearch Manuf Co, Torrance, CA, USA). *Journal of Heat Recovery Systems;* 2: No. 2, 189-199(1982).

This paper summarizes the results of a conceptual design study for ceramic heat pipe recuperators. The function of the recuperator is to preheat combustion air with industrial furnace exhaust gases, thus effecting a substantial fuel saving as compared with unrecuperated, non-preheated furnaces. The proposed recuperator system consists of two heat exchanger units: a high-temperature ceramic heat pipe recuperator using sodium as the working fluid and a low-temperature metallic plate-fin recuperator. Systems were designed for three furnace applications. 6 refs.

23867 **Update of the 'development of alternate liquid fuels'. Paper 81.24.7.** Rose, M.J. (Brookhaven Natl Lab, Upton, NY, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

An evaluation is given of the properties and performance of alternate liquid fuels ALF which have essentially same characteristics as other conventional fuel oils number 2,4 and 5. Such fuels may be produced for 65 cents per gallon. Preliminary results of the pilot plant operation for preparing these fuels are reported. Feedstocks are reclaimed from wastes various chemical plants, containing naphtha, benzene, methanol, ethanol, xylene and other aromatic hydrocarbons.

23868 **1981 Winter Meeting - American Society of Agricultural Engineers.** *ASAE (American Society of Agricultural Engineers) Technical Paper;* vp(1981). (CONF-811221—).

From American Society of Agricultural Engineers meeting; Chicago, IL, USA (15 Dec 1981).

The 13 volumes contain 372 papers presented at the meeting. Subjects covered include agricultural machinery developments and applications, irrigation, drainage, water supply, water pollution control, farm buildings, energy conservation, agricultural wastes management, biogas and other biomass fuels production, food products and good products plants, grain drying, solar energy applications, engineering economics, crop yield studies, agronomy, agrometeorology, livestock production and management, computer applications, field and laboratory studies, engineering education, and others. 108 papers are abstracted separately.

23869 **Commercial scale production of alfalfa leaf protein concentrate.** Edwards, R.H.; Miller, R.E.; Kohler, G.O. (USDA, Berkeley, CA, USA). *ASAE (American Society of Agricultural Engineers) Technical Paper;* No. 81-1524, 1-27(1981). (CONF-811221—).

From American Society of Agricultural Engineers meeting; Chicago, IL, USA (15 Dec 1981).

A commercial alfalfa dehydration facility has been converted to a leaf-protein-concentrate plant with a design capacity of 30 tons of chopped alfalfa per hour. The design and operation of the plant, energy consumption,prod product yields and values, and results of unit operation experiments are reported. 32 refs.

3206 Municipalities And Community Systems

REFER ALSO TO CITATION(S) 23217, 23387, 23703, 23853, 24402

23870 **(AD-A—120639/0) Resource recovery technology application document. Final report.** (SCS Engineers, Inc., Long Beach, CA (USA)). Jun 1982. 240p. NTIS, PC A11/MF A01.

This document is intended to provide guidance to Naval shore facilities in planning and selecting solid waste management and resource recovery technology. The document consists of a state-of-the-art review of technology available for materials and energy recovery based on information and data from latest published research and documented practical experience. The technologies presented include both Navy scale (40 TPD) and municipal scale (up to 2,000 TPD) systems. The document is arranged to provide a large amount of data in a concise format and, therefore, makes liberal use of tables and charts. Systems are grouped into three categories: material recovery systems, fuel recovery systems, and combustion systems. The unit operation making up systems in each of these areas are fully described in the appendixes to the document. The document is presented in loose leaf format to allow updating as new information is developed.

23871 **(ANL/CNSV-TM—109) Computer optimization of landfill-cover design.** Massmann, J.W.; Moore, C.A. . (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 83p. NTIS, PC A05/MF A01. Order Number DE83008635.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A finite difference computer program to aid optimizing landfill-cover design was developed. The program was used to compare the methane yield from sand-covred and clay-covered landfills equipped with methane-recovery systems. The results of this comparison indicate a clay cover can restrict air inflow into the landfill system, thus preventing oxygen poisoning of the methane-producing organisms. The practice of monitoring methane-to-air ratios in the pipelines of the recovery system in order to warn of oxygen infiltration into the fill material was shown to be ineffective in some situations. More-reliable methods to forewarn of oxygen poisoning are suggested.

23872 **(ANL/NESC—799) TDIST2; community energy consumption analysis.** Golay, M.W. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048799.

TDIST2 can handle a maximum of 20 different building types. Piping systems used in the total energy system can have only one energy source.

The TDIST2 program designs and performs an analysis of community size total energy systems supplying thermal and electrical energy to a multi-consumer-type metropolitan area. The program models the time-dependent energy requirements of building unit consumers, distributes these demands within a Thermal Utility System (TUS), simulates the TUS performance and determines the required behavior of the power station and thermal-energy storage reservoir. The energy requirements of the community fall into three categories: space conditioning demands (heating and cooling), electric non-space conditioning demands (load from use of lights, motors, etc.), and hot water demands.IBM370,303x; FORTRAN IV, IBM FORTRAN G compiler; OS/370 MVT, Release 21.7; 250K bytes of memory, card-image input unit, and printer and card-punch output units.

23873 **(CONF-8204119—1) Landfill gas recovery in the USA.** Wilkey, M.; Zimmerman, E. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008625.

From 3. international recycling congress; Berlin, F.R. Germany (19 Apr 1982).

Portions are illegible in microfiche products.

The source of combustible gas in sanitary landfills, recovery techniques, and processing utilization options are discussed. Landfill gas recovery facilities anticipated to be online in the next two years and the status of planned gas projects in the USA are shown. Federally funded landfill gas research projects are listed. (MHR)

23874 **(DOE/CS/20101—1) Review and evaluation of a bioconversion-process demonstration plant and its related technologies.** (Reutter (John G.) Associates, Camden, NJ (USA)). Feb 1983. Contract AC01-78CS20101. 197p. NTIS, PC A09/MF A01. Order Number DE83009349.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Existing resource recovery processes are reviewed and the biological process as cultivated at the Refuse Conversion of Methane (RefCOM) facility at Pompano Beach, Florida, is evaluated. The specific goals and detailed test programs are outlined. The RefCOM facility suffered from both operational and mechanical difficulties, and as a result the planned experimental program fell approximately two years behind schedule and was never completed due to termination of project funds. The following are reported here: state-of-the-art evaluation, site assessment criteria and constraints development, concept inplementation, and concept design. (MHR)

23875 **(DOE/CS/20156—T2) Resource-recovery option in solid-waste management: a review guide for public officials.** Nemeth, D.M. (American Public Works Association, Washington, DC). Mar 1983. Contract FC01-80CS20156. 45p. NTIS, PC A03/MF A01. Order Number DE83009169.

The following aspects of resource recovery facilities are discussed: financing, risk management, energy and materials recovery, marketing, selection of a process system, operation and maintenance, and siting and environmental considerations. (MHR)

23876 **(DOE/CS/20451—T1) Energy recovery from the effluent of plants anaerobically digesting urban solid waste.** (Systems Technology Corp., Xenia, OH (USA)). Mar 1983. Contract AC01-78CS20451. 100p. NTIS, PC A05/MF A01. Order Number DE83009183.

The program objective was to study the parameters of concentration, time, temperature, and pH to find optimum conditions for enzymatically converting unreacted cellulose in the effluent of an anaerobic digester to glucose for ultimate conversion to methane, and then to project the economics to a 100-tons-per-day plant. The data presented illustrate the amount of cellulose hydrolysis (in percent solubilized mass) for enzyme concentrations from 5 to 1000 C_1U/gram of substrate using either filter paper or anaerobically digested municipal solid waste (MSW) reacted over periods of time of from 0 to 72 hours. With an active bacterial culture present, the optimum temperature for the hydrolysis reaction was found to be 40°C. The feasibility of recycling enzymes by ultrafilter capture was studied and shows that the recovered enzyme is not denatured by any of several possible enzyme loss mechanisms - chemical, physical, or biological. Although rather stable enzyme-substrate complexes seem to be formed, various techniques permit a 55% enzyme recovery. Posttreatment of digested MSW by cellulase enzymes produces nearly a threefold increase in biomethanation. However, the value of the additional methane produced in the process as studied is not sufficient to support the cost of enzymes. The feasibility of enzymatic hydrolysis as a biomethanation process step requires further process optimization or an entirely different process concept.

23877 **(EPRI-CS—2723) Seminar proceedings: municipal solid waste as a utility fuel.** (Electric Power Research Inst., Palo Alto, CA (USA)). Nov 1982. 87p. (CONF-8205166—). NTIS, PC A05/MF A01. Order Number DE83900756.

From Seminar on municipal solid waste as a utility fuel; Miami Beach, FL, USA (13 May 1982).

Portions are illegible in microfiche products.

The purpose of the seminar was to update the status of municipal and regional refuse-to-energy projects involving utilities. Recent experience is described with cofiring refuse-derived fuel with coal in tangential, wall, and cyclone-fired boilers at Ames, Iowa, Rochester, New York, Madison, Wisconsin and Baltimore, Maryland. Other topics addressed include the new coal/RDF cofired power plant in Lakeland, Florida, startup experience with the dedicated refuse-fired facility in Gallatin, Tennessee, and recent results of EPRI-sponsored projects.

23878 **(PB—83-127563) Guidebook for evaluation of resource recovery systems in municipalities.** Tiller, J. (Georgia Inter-Univ. Task Force (USA)). May 1979. 46p. NTIS, PC A03/MF A01.

This handbook explains what resource recovery systems are and how municipalities can determine their feasibility. Material recycling, material conversion and energy conversion are discussed, as are the two technical approaches for performing these functions, source separation and mechanical processing. Topics addressed include the problems that can be solved by resource recovery, the evaluation of components of municipal solid waste, the identification of markets for recycled products, and the evaluation of source separation systems and mechanical processing options. The handbook is intended for use by municipalities with populations less than 50,000. A workbook section is provided.

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS

3301 Internal Combustion Engines

23879 **(DOE/BC/10467—11) Effects of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: John Deere 6466T. Final report.** Likos, W.E.; Moses, C.A. (Southwest Research Inst., San Antonio, TX (USA). Energy System Research Div.). Mar 1983. Contract AC19-81BC10467. 30p. NTIS, PC A03/MF A01. Order Number DE83006618.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A 500-h durability test was conducted to evaluate the effects of using 160-proof ethanol to supplement diesel fuel in a 157-HP John Deere, diesel engine. The ethanol was sprayed into the intake manifold of the engine at a rate equal to 25% (vol.) of the total fuel flow. Performance testing for power and emissions and pre- amd post-inspections of critical components of the engine confirmed that no significant changes occurred to the engine due to the alcohol fueling. It was concluded that alcohol fumigation, done under the conditions of this test, does not result in serious wear of durability penalties.

23880 **(DOE/BC/10467—12) Effect of low-proof alcohol utilization to supplement diesel fuel on engines life expectancy: Caterpillar 3306 PCI. Final report.** Likos, W.E.; Moses, C.A. (Southwest Research Inst., San Antonio, TX (USA). Energy System Research Div.). Mar 1983. Contract AC19-81BC10467. 31p. NTIS, PC A03/MF A01. Order Number DE83006617.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A 500-hour durability test was conducted to evaluate the effects of using 160-proof ethanol to supplement diesel fuel in a 187-HP Caterpillar, diesel engine. The ethanol was sprayed into the intake manifold of the engine at a rate equal to 25% (vol.) of the total fuel flow. Performance testing for power and emissions and pre- and post-inspections of critical components of the engine confirmed that no significant changes occurred to the engine due to the alcohol fueling. It was concluded that alcohol fumigation, done under the conditions of this test, does not result in serious wear or durability penalties.

23881 **(DOE/BC/10467—13) Effect of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: International Harvester D436. Final report.** Likos, W.E.; Moses, C.A. (Southwest Research Inst., San Antonio, TX (USA). Energy System Research Div.). Mar 1983. Contract AC19-81BC10467. 51p. NTIS, PC A04/MF A01. Order Number DE83006616.

A 500-h durability test was conducted to evaluate the effects of using 160-proof ethanol to supplement diesel fuel in a 138 HP International Harvester, diesel engine. The ethanol was sprayed into the intake manifold of the engine at a rate equal to 25% (vol.) of the total fuel flow. Performance testing for power and emissions and pre- and post-inspections of critical components of the engine confirmed that no significant changes occurred to the engine due to the alcohol fueling. It was concluded that alcohol fumigation, done under the conditions of this test, does not result in serious wear or durability penalties.

23882 **(SAND—82-2227-Vol.7-No.1) Sandia technology.** Thornbrough, A.D. (ed.). (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 32p. NTIS, PC A03/MF A01. Order Number DE83008166.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The following topics are discussed: the physical and chemical processes inside operating internal combustion engines which are being studied to improve IC engine performance; the CHEMKIN computer code for theoretical modeling studies of combustion kinetics; an acoustic thermometer capable of measuring temperatures to 3000°C and which can be used in reactor safety studies; and the new application of inertial navigational techniques to more accurate wellbore surveys. (LCL)

3303 Electric-powered Systems

REFER ALSO TO CITATION(S) 23729

23883 **(CONF-820814—40) Mission analysis of second cars to determine electric-vehicle suitability.** Nelson, S.H. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008671.

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

This study analyzes the missions of urban household second cars to determine the range specifications for electric vehicles (EVs) to effectively perform these missions. The approach adopted is a detailed analysis of the 1977 National Personal Transportation Survey (NPTS). The data in the NPTS were divided into four categories depending on whether the travel day was a weekday or a weekend and whether or not there were any work trips. Detailed analysis of the four categories indicate that the ranges needed to satisfy at least 25%, 50%, and 75% of urban multicar households are 50, 60, and 75 miles, respectively.

23884 **(CONF-821015—8) Three-dimensional thermal modeling of eV batteries.** Lee, J.; Choi, K.W.; Christianson, C.C.; Yao, N.P. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83008689.

From Electrochemical Society fall meeting; Detroit, MI, USA (17 Oct 1982).

A two-dimensional mathematical model was developed to predict the temperature excursion of a single-module battery. For the eV application, however, a large number of cells or modules are often needed to power a vehicle of practical size. Generally the temperature rise in these modules will be higher than that of a single module. Significant temperature variation among cells and modules has also been observed. In order to accurately predict and subsequently to control the temperature of a full-size battery during its operation, a three-dimensional model capable of depiciting thermal interactions among cells and modules was derived and is described. It was found that the numerical method employed is stable, while the number of iterations required strongly depends on the rate of battery heat generation. A typical result of the modeling is shown, in which the temperature distribution at the mid-height cross-section of a 3-module lead-acid battery is presented. The result shows that the average temperature of modules rises from 25°C to ~ 33°C after two hours of charging at C/3 rate. The existance of sharp temperature gradient near the external surface indicates the high internal thermal resistance of the battery. The small gap between modules, although provide a heat sink, is not effective in dissipating heat under the free convection condition. The result also demonstrates that higher temperature exists near the area whose surface is covered by other modules. The model was also applied to study the thermal behavior of ground nickel/iron cells at various discharge rates and different array arrangement. The effects of cooling rate and the spacing between cells were also studied. Based on estimated parameters, the model prediction agree well with preliminary measurements of cell temperature.

23885 **(CONF-8104192—3) Batteries for electric vehicles.** Nelson, P.A.; Webster, W.H.; Shimotake, H. (Argonne National Lab., IL (USA); USDOE, Washington, DC). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007751.

From Forum on fuel cell and secondary batteries for load leveling; Tokyo, Japan (13 Apr 1981).

Electric-vehicle batteries are under development in programs sponsored by the U.S. Department of Energy with the main objectives of accelerating development in industry when the program began and of developing new high-performance systems. To achieve the first objective, lead-acid, nickel-iron, nickel-zinc and zinc chlorine batteries are under development. Of these batteries, the lead-acid battery is most certain of achieving its goals, and the zinc-chlorine battery has the most favorable combination of goals for specific energy (60 to 70 Wh/kg), specific power (90 to 100 W/kg), life (1500 cycles), and cost. To meet the needs of advanced electric passenger cars, a battery is required that has a specific energy of least 100 Wh/kg. Lithium/metal sulfide and sodium/sulfur batteries are under development for that application. Iron-air and aluminum-air batteries also show promise and are under development in smaller programs. The aluminum-air battery is of interest because of its potentially very high specific energy (300 Wh/kg), but it will require mechanical recharging by replacement of the aluminum alloy plates. In all of the above programs, a combination of long cycle life and low cost appears to be more difficult to achieve than the other objectives set for each battery, such as specific energy and specific power.

23886 **(DOE/CE—0028/1) 6th annual report to Congress for fiscal year 1982. Electric and Hybrid Vehicles Program.** (USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC. Office of Vehicle and Engine Research and Development). 1982. 23p. NTIS, PC A02/MF A01. Order Number DE83008759.

This sixth annual report on the implementation of the Electric and Hybrid Vehicle Research, Development and Demonstraton Act of 1976 (Public Law 94-413, as amended by Public Law 95-238, referred to as the Act) complies with the reporting requirements established in Section 14 of the Act. In addition to informing

Congress of the progress and plans of the Department of Energy Electric and Hybrid Vehicles Program, this report is intended to serve as a communication link between the Department and all of the public and private interests involved in making the program a success. During FY 1982, significant progress was made toward implementing the policies established by Congress in the Act. There has been a consistent increase in interest shown by both the automobile manufacturing and supply sectors of our economy in electric and hybrid vehicles. Research and development efforts in batteries and propulsion components, as well as total vehicle systems, continue to achieve significant progress in providing industry with technology options that will result in vehicles with greater public acceptance. Vehicles currently in use by site operators are being updated selectively with advanced technology and tested to assess the capability of the vehicles to accomplish practical work functions.

23887 **Electric vehicles: assessment of potential for North Central Region farm operations.** Resen, M.; Calkins, P.; Christianson, L. (SD State Univ, Brookings, USA). *ASAE (American Society of Agricultural Engineers) Technical Paper;* No. 81-1547, 24(1981). (CONF-811221—).

From American Society of Agricultural Engineers meeting; Chicago, IL, USA (15 Dec 1981).

Technical feasibilities of battery-powered electric vehicles for replacing conventional petroleum-powered vehicles were analyzed for the North Central Region. Forty-one farm operations were studied in detail to determine vehicle requirements as functions of tasks and then to estimate the percentages of these tasks which could be performed by specific sizes of electric vehicles. Approximately 50% of tractor petroleum consumption could be replaced with up to a 60 HP electrical tractor. 16 refs.

3304 Hybrid Systems

REFER ALSO TO CITATION(S) 23729, 23883, 23886

3308 Alternative Fuels

REFER ALSO TO CITATION(S) 23225, 23230, 23237, 23239, 23879, 23880, 23881

36 MATERIALS

23888 **(CONF-8209105—1) Phase transitions in high magnetic fields.** Arko, A.J.; Beers, C.J.; van Deursen, A.P.J.; van Kleef, R.P.A.R.; Myron, H.W.; Parker, M.R.; Pepper, M.; Poole, D.A.; Rasing, T.H.M.; Wyder, P. (Katholieke Univ. Nijmegen (Netherlands)). Aug 1982. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83007719.

From Conference on physics of semiconductors in high magnetic fields; Grenoble, France (1 Sep 1982).

Portions are illegible in microfiche products.

The purpose of this paper is to summarize some of the research activities recently performed at the Laboratorium voor Hoge Magneetvelden at the University of Nijmegen. The scope here and unifying aspect is magnetically induced phase transitions. Here we summarize transitions in the settling velocity of paramagnetic aggregates, suppression of spin fluctuations in UAl_3, the phase diagram of a ferroelectric chiral smectic liquid crystal near the Lifshitz point and the transition from 3D to 2D conduction in a GaAs FET. In no way does this represent a complete review of transitions, but rather a summary of phase transitions observed at the magnet laboratory during the past year. 6 figures.

23889 **Optical spectroscopy and electron paramagnetic resonance of Pa^{4+} in $ThBr_4$ and $ThCl_4$ crystals.** Krupa, J.C.; Hubert, S.; Foyentin, M.; Gamp, E.; Edelstein, N. (Laboratoire de Radiochimie, Institut de Physique Nucleaire, Universite de Paris-Sud, B.P. No. 1, 91406 Orsay Cedex, France). *Journal of Chemical Physics;* 78: No. 5, 2175-2179(1 Mar 1983).

Polarized absorption and emission spectra of Pa^{4+} in $ThCl_4$ and $ThBr_4$ host matrices were recorded at different temperatures from 4.2 to 300 K in the infrared range. The seven crystal field levels of the $5f^1$ configuration were determined from the optical data and fit by a parametrized model assuming a D/sub 2d/ site symmetry for the Pa^{4+} ion. However, at low temperature both matrices undergo a displacive phase transition and the low temperature structure is incommensurate and modulated. The halide position modulation reduces the site symmetry from D/sub 2d/ to D_2 for some Pa^{4+} ions, and, consequently, the shapes of some absorption bands are characterized by edge singularities. EPR experiments performed on these doped crystals provided g values for the ground state of Pa^{4+} which fit satisfactorily with the values calculated from the optical data.

23890 **Report of the fourth BES Welding Research Program meeting.** *BES Welding Bulletin;* 1-14(Dec 1981).

From Fourth BES Welding Research Program Annual Meeting; Golden, CO, USA (17 Sep 1981).

Developments in DOE welding R & D programs, compiled and edited by Materials Technology Division, EG & G Idaho, Inc., were distributed to DOE Basic Energy Sciences and its welding program contractors for information and comment.

3601 Metals And Alloys

REFER ALSO TO CITATION(S) 22898, 22930, 23145, 23310, 23315, 23407, 23465, 23498, 23500, 23505, 23516, 23551, 23553, 23842, 24066, 24118, 24130, 24171, 24721, 24725, 24746, 24911, 24911, 24911, 24956, 25008, 25161, 25164, 25173

23891 **(AD-A—122137/3) SCF-X alpha-SW cluster molecular-orbital models of catalysts, alloys, magnetic materials, and superconductors. Interim report.** Johnson, K.H. (Massachusetts Inst. of Tech., Cambridge (USA). Center for Materials Science and Engineering). 29 Nov 1982. 50p. NTIS, PC A03/MF A01.

Recent self-consistent-field Xalpha scattered-wave (SCF-Xalpha-SW) molecular orbital studies of the electronic structures, chemical bonding, and related (e.g. catalytic, magnetic, and superconducting) properties of metal and alloy clusters are reviewed, including results for: (1) Li clusters, (2) Cu, Ni, Pd, and Pt clusters, (3) relativistic contributions to cluster electronic structure, (4) the interaction of hydrogen with Ni, Pd, and Pt clusters, (5) metal-support (Pt-SiO2 and Ru-SiO2) interactions, (6) magnetism of Fe clusters, (7) cluster of models of transition-metal impurities and their magnetic properties in copper and aluminum hosts, (8) cluster models of intermetallic compounds and solid-solution alloys, (9) cluster models of amorphous alloys, and (10) cluster molecular-orbital models of superconductors.

23892 **(BMFT-FB-T—79-106) Long time corrosion testing with and without mechanical stress of high temperature alloys for blades of land based gas turbines with high output.** Schmitz, F. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1979. 106p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750333.

Portions are illegible in microfiche products.

In the Eurocop COST 50 Programme, 'Materials for Gas Turbines, High Temperature Corrosion Group', nickle and cobalt based alloys in normal supply were examined in laboratory corrosion tests without and partly with simultaneous mechanical stress during the period 1973 - 1976. The high temperature corrosion tests without mechanical stress, which were performed for up to 4000 hours at temperatures of 700°C - 850°C, have provided a clear evaluation scale for the materials. All tests showed the great influence of the chrome content in the alloys. Of the nickel based alloys, the material IN 939 (23% Cr) possessed the greatest resistance to high temperature corrosion and of the cobalt based alloys, the material FSX 414 (30% Cr). The high temperature corrosion tests with simultaneous mechanical stress, led to a reduction in the creep strength with the forged alloy U 520 but the high quality cast alloys IN 738LC and U 500 showed no important reduction.

23893 **(CONF-810756—4) Positron prevacancy effects in pure annealed metals.** Smedskjaer, L.C. (Argonne National Lab., IL (USA)). Jun 1981. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83007930.

From International school of physics position in solids conference; Lake Como, Italy (14 Jul 1981).

Portions are illegible in microfiche products.

The low-temperature prevacancy effects sometimes observed with positrons in well-annealed high-purity metals are discussed. It is shown that these effects are not experimental artifacts, but are due to trapping of the positrons. It is suggested that dislocations are responsible for these trapping effects. 46 references, 5 figures.

23894 **(CONF-810809—30) Metamagnetism of palladium.** Jarlborg, T.; Freeman, A.J. (Northwestern Univ., Evanston, IL (USA); Argonne National Lab., IL (USA)). Apr 1981. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83007804.

From 16. international conference on low temperature physics; Los Angeles, CA, USA (19 Aug 1981).

Self-consistent spin-polarized energy band studies with the applied magnetic field included, show Pd metal to undergo a metamagnetic transition in high magnetic fields. The calculated moments and susceptibilities are found to be greatly enhanced for tetragonally (stretched) Pd as in the Au/Pd/Au sandwiches studied by Brodsky and Freeman and to indicate the possibility of ferromagnetism in tet. pd.

23895 **(CONF-810913—Vol.1) Environmental degradation of engineering materials in aggressive environments.** Louthan, M.R. Jr.; McNitt, R.P.; Sisson, R.D. Jr. (eds.). (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Lab. for the Study of Environmental Degradation of Engineering Materials). 1981. 572p. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

This book is one volume of the proceedings of the second conference on Environmental Degradation of Engineering Materials held at Virginia Polytechnic Institute on September 21-23, 1981. Papers in this volume describe fatigue and corrosion fatigue, liquid metal embrittlement, nuclear environment effects, degradation of composites and polymers, stress corrosion cracking and both analytical and experimental attempts to simulate or model the process of degradation. The other volume of the proceedings Environmental Degradation of Engineering Materials in Hydrogen contains papers which describe hydrogen uptake and transport by metals, hydrogen adsorption and evolution from metals and hydrogen embrittlement of metals. Forty-two papers have been abstracted and indexed for the Energy Data Base.

23896 (CONF-810913—Vol.1, pp 3-14) **Sulfide attack in steam surface condensers.** Syrett, B.C. (Electric Power Research Inst., Palo Alto, CA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Recent surveys and literature reviews indicate that sulfide attack is one of the more frequent causes of failure of copper alloy condenser tubes. This paper reviews the sources of the sulfide, the location of the failures, and the methods that can be used to prevent this form of corrosion. Two mechanisms of sulfide attack are discussed and both require that oxygen be present in the cooling water at some time. Accelerated-corrosion does not occur in oxygen-free, sulfide-polluted water. The highest corrosion rates are believed to occur when sulfide and oxygen coexist in the cooling water, but significant increases in corrosion rate can occur in aerated, unpolluted water if the copper alloy has been preexposed to oxygen-free, sulfide-polluted water. 6 figures.

23897 (CONF-810913—Vol.1, pp 15-23) **Sea water corrosion of two-phase Cu-10Ni-8Sn.** Louzon, T.J. (Bell Telephone Labs., Murray Hill, NJ). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The Cu-10Ni-8Sn alloy is presently being considered for undersea applications. This has prompted corrosion studies of the alloy. Recently a new two-phase heat treatment was developed which increased the mechanical properties. Samples processed using variations of the aforementioned two phase process were exposed to sea water for 389 days. The corrosion rate was found to be moderately higher for this material than for material heat treated in accordance with standard practice. This seems to be due to the second phase and Cb-Ni intermetallic compounds present which are more noble than the matrix. 9 figures, 1 table.

23898 (CONF-810913—Vol.1, pp 25-32) **Grain boundary segregation and intergranular corrosion of nickel.** Bruemmer, S.M.; Jones, R.H.; Thomas, M.T.; Baer, D.R. (Pacific Northwest Lab., Richland, WA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098. Contract AC06-76RL01830.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The susceptibility of nickel to intergranular corrosion has been investigated at anodic potentials in a 1N H_2SOA_4 solution as a function of grain boundary chemistry. Static corrosion tests have been conducted on vacuum melted nickel, nickel-300 appm phosphorus and nickel 440 appm antimony alloys. Specimens were given various heat treatments to obtain a range of segregation levels. The tendency for intergranular dissolution was compared to grain boundary chemistries measured by in-situ fracture in the Auger Electron Spectrometer. Intergranular corrosion was observed in two regions of the polarization curve depending on grain boundary chemistry. At potentials in the active region of the polarization curve; sulfur enrichment at grain interfaces induced intergranular attack. The depth of this attack was directly proportional to the grain boundary sulfur coverage. The segregation of phosphorus and antimony had no discernable effect on the dissolution behavior at these active potentials. However, in the transpassive region of the polarization curve, sulfur and phosphorus prompt preferential intergranular corrosion. Both elements appear to inhibit the formation of a stable passive film and thus cause rapid localized attack. No deleterious effect of antimony segregation was observed during static corrosion tests.

23899 (CONF-810913—Vol.1, pp 33-42) **Corrosion behavior of high density tungsten alloys.** Levy, M.; Chang, F. (Army Materials and Mechanics Research Center, Watertown, MA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The corrosion behavior of high density tungsten alloys (W $\geq$ 90 w/o) has been examined by electrochemical potentiostatic polarization methods and weight loss measurements in full immersion tests. Electrochemical tests were carried out in aqueous solutions, buffered to pH 4, 9, 12 with and without 0.1 M NaCl and immersion tests in 5% NaCl solution. Pure tungsten and all the alloys studied undergo active-passive transitions and corrosion rates increase with increasing pH. The chloride ion generally increases corrosion rates slightly, but in pH12 solution, the chloride ion inhibits the anodic reaction to some extent. A 97W-2Ni-0.7Fe-0.3Co alloy was fpound to be the most corrosion resistant in solutions containing chloride ions. The data also suggests that copper as an alloying element accelerates corrosion of tungsten alloys in NaCl solution. Both general dissolution and localized attack at grain boundaries were observed.

23900 (CONF-810913—Vol.1, pp 43-48) **In-situ studies of reduction reactions of weathering steel surface films by Raman spectroscopy.** Keiser, J. (Univ. of Rhode Island, Kingston); Brown, C.; Heidersbach, R. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The electrochemical reduction of α, γ, Δ, and amorphous FeOOH was studied in an aqueous sulfate solution. The electrochemical potential was monitored as a function of time under constant current conditions. Infrared and Raman spectroscopy were used to monitor the changes in reaction products. Amorphous, γ, and δ FeOOH pastes applied to weathering steel substrates were reduced to magnetite, Fe_3O_4, under the experimental conditions of this project. Fe_3O_4 and α-FeOOH were not reduced under these conditions. The atmospheric corrosion production on a weathering steel exposed in a rural environment was reduced to Fe_3O_4 and had a galvanostatic reduction curve similar to that for γ-or Δ-FeOOH.

23901 (CONF-810913—Vol.1, pp 49-56) **Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces.** Lynch, P. (Univ. of Rhode Island, Kingston); Brown, C.; Heidersbach, R. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Infrared and Raman spectroscopy were used to study the presence and structure of organic corrosion inhibitors on iron substrates. A unique infrared spectrum was analyzed for each of the three inhibitor solutions studied. These spectra changed with alterations in solution pH, indicating a sensitivity of these inhibitors to even small changes in environmental acidity/alkalinity. The presence of a resonance Raman spectrum enhancement of a proprietary corrosion inhibitor on an iron substrate is discussed in detail.

23902 (CONF-810913—Vol.1, pp 59-72) **Part-through and compact tension corrosion fatigue crack growth behavior of carbon steel in high temperature water.** Prater, T.A.; Coffin, L.F. (Corporate Research and Development, Schenectady, NY). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The effect of temperature on the fatigue crack initiation and growth of carbon steel SA 333 Grade 6 in 8 ppM O_2, 1500 psi water is reported. Although much of the work is derived from the use of compact tension (CT) test specimens, some of the results are obtained from uniaxially loaded part-through crack specimen geometries. A newly developed technique for monitoring part-through cracks, called the reversing dc electric potential crack growth method, is described. The method is essentially continuous and allows the separation of time and cycle dependent crack growth for trapezoidal wave shape loading. Using this technique it was ascertained that much of the environmental acceleration in crack growth at 550°F is a result of a creep/environment interaction which disappears when the temperature is lowered below 400°F. Support for these findings is provided from crack initiation studies on notched CT specimens and from growth measurements in this environment at temperatures from 300 to 550°F. 11 figures.

23903 (CONF-810913—Vol.1, pp 73-81) **Fatigue crack growth in aqueous and gaseous environments.** Wei, R.P. (Lehigh Univ., Bethlehem, PA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Recent fracture mechanics and surface chemistry studies of fatigue crack growth in high-strength aluminum alloys and steels exposed to gaseous environments have shown that crack growth may be controlled either by gas-phase transport of the environment to the crack tip or by surface reactions of the environment with the newly created surfaces to produce hydrogen. Modeling of response and quantitative correlations between the chemistry and fracture mechanics data have been established. Extensions of these concepts and the approach to the study of fatigue crack growth in aqueous environments have been made with some success. Quantitative comparisons between crack growth response in the two types of environments are made and discussed, and the unifying features are considered. Suitable chemical and electrochemical measurements that can contribute to further understanding of environmentally assisted fatigue crack growth are discussed. 3 figures.

23904 (CONF-810913—Vol.1, pp 83-95) **Assessment of corrosion fatigue behavior of offshore structures.** Salama, M.M.; Vennett, R.M. (Conoco Inc., Ponca City, OK). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

A statistical analysis of more than 230 data points is presented to assess the effect of environment, protection level, and loading condition on the fatigue performance of welded joints in sea water. These results indicate that the current design rules appear to be satisfactory even for freely-corroded joints in sea water. They also show that for long lives (above 10^9 cycles) cathodically protected joints exhibited better fatigue life than those tested in air. Also, joints that were freely corroded showed a reduction in fatigue life from those tested in air by a factor of about two and a half. The effect of stress ratio and stress relief on corrosion fatigue life appears to be negligible. The paper also identifies several areas that require further study to enhance our confidence in the fatigue design of offshore structures, particularly those proposed for deep water applications. 13 figures, 2 tables.

23905 (CONF-810913—Vol.1, pp 97-111) **Fatigue of welded structural steel in sea water.** Hartt, W.H. (Florida Atlantic Univ., Boca Raton). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Fatigue at welded tubular connections has been judged to be critical with regard to integrity of offshore steel structures of the type employed for petroleum production. The causes of this type of failure are summarized, and difficulties associated with efficient and effective design for fatigue mitigation are discussed. Particular emphasis is placed upon appropriateness of the design S-N curve and the need for developing data in the 10^7 to 10^8 cycles-to-failure regime under realistic conditions of electrochemical potential, frequency, plate thickness and weld profile. Both existing and new data are rationalized within this perspective, and the advantages of a design approach which incorporates both initiation and growth rate criteria are stressed. 10 figures.

23906 (CONF-810913—Vol.1, pp 113-123) **Investigation of fatigue crack growth in a 288°C PWR water environment by a constant ΔK test method.** van der Sluys, W.A. (Babcock and Wilcox, Alliance, OH); DeMiglio, D.S. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Fatigue crack growth experiments using a constant ΔK test technique were conducted on three 50.8 mm thick compact fracture specimens of SA508-2 in a 288°C simulated PWR water environment. Alternating stress intensity factor (ΔK) values were investigated in the range 16.5 to 44 MPa$\sqrt{m}$ at sinusoidal loading frequencies ranging from 10 to .017 Ha (1 cpm) and R ratios 0.03 to 0.72. For a given ΔK and frequency, ΔK was held constant to within 1%. A steady-state rate of crack growth per cycle of stress

(da/dN) was determined for each test condition. Over a typical crack extension of ~ 1.3 mm, the crack growth rate in many cases was a constant. As many as 14 separate experiments were conducted on a single specimen. There was no influence of prior loading history or crack length on the crack growth rate. It was found that the crack growth rate was controlled by the Δk, frequency, and R ratio of the test. Large changes in the crack growth rate did not occur as the frequency of loading was decreased from >?1 Hz to .017 Hz (1cpm). As compared to high frequency results (>1 Hz) the crack growth rate increased slightly at 1 cpm for $\Delta K > 22$ MPa$\sqrt{m}$ and decreased slightly for $\Delta K < 22$ MPA$\sqrt{M}$.

23907 (CONF-810913—Vol.1, pp 131-139) **Environmental effects on fatigue crack initiation and early propagation.** Duquette, D.J. (Rensselaer Polytechnic Inst., Troy, NY). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Corrosive environments lead to severe degradation of fatigue properties of metals and alloys. Studies directed toward understanding the fundamentals of the early stages of corrosive effects on fatigue damage and crack initiation, while limited, have led to a model to explain these phenomena. It is suggested that, preferential corrosion of fatigue generated mobile slip bands tends to enhance the surface deformation in these bands. This enhanced deformation intensifies surface slip effects leading to preferred crack initiation and early growth. 2 tables, 7 figures.

23908 (CONF-810913—Vol.1, pp 143-152) **Environmental variables and stress corrosion crack propagation rates.** Scully, J.C. (Univ. of Leeds, England). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Environmental variables affect stress corrosion crack propagation rates because of their effect upon the film formation rate at the crack tip. The potential has a major influence but only where film formation is possible. Aggressive ions increase propagation rates at constant potential. A dynamic interaction between strain-rate, ϵ, and repassivation rate, r, creates and maintains the solution at the crack tip in halide solutions at a composition that causes propagation. The boundary between cracking and non-cracking is determined by solution additions. Protective species retard crack propagation rates at constant potential and in many examples alter the crack morphology. 4 figures.

23909 (CONF-810913—Vol.1, pp 153-162) **Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement.** Scamans, G.M. (Alcan International Ltd., Banbury, England). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Intergranular fracture of commercial AlZnMg and AlZnMgCu alloys occurs by an essentially brittle decohesion of the grain-boundary plane, both under the influence of hydrogen, which must be generated at the crack tip for each successive fracture event, and under the influence of gallium adsorbed at the crack tip which may hence eliminate the arrest stage. In the case of hydrogen, propagation of stress-corrosion cracks is stimulated by the segragation of magnesium to the grain boundary which increases the activity of the crack tip region and promotes both hydrogen entry and its diffusion along the grain boundary. The fracture event may be modelled as decohesion of planes of magnesium rather than aluminium atoms. The influence of magnesium segregation on liquid metal fracture was not incorporated in the present investigation. The apparent insensitivity of the magntidue of individual crack advances of stress corrosion cracks to wide changes in stress and heat-treatment practice, and therefore mechanical properties of the crack tip enclave, suggests that the value of each crack jump is governed more by the elastic properties of the region which are not influenced by such parameters. The cracking rate is controlled by the grain-boundary diffusion rate of hydrogen which will depend both pon the level of segregated magnesium, the applied stress and the number and density of trap sites. The future for the elimination of stress-corrosion cracking in both AlZnMg and AlZnMg Cu alloys may lie in control of both grain-boundary chemistry (magnesium segregation) through heat-treatment modification and grain-boundary structure by minor elements additions. 6 figures.

23910 (CONF-810913—Vol.1, pp 173-179) **Slow strain rate stress corrosion testing of boiler construction materials in synthetic flue gas at elevated temperatures.** Thorpe, S.J. (Univ. of Toronto, Ontario); Ramaswami, B.; Aust, K.T.; Mayer, P. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

This study examines the stress corrosion cracking (SCC) susceptibility of materials employed in the construction of fossil fired boilers. Investigation of the susceptibility of 1 1/4% Cr - 1/2$ Mo and 2 1/4% Cr - 1% Mo ferritic steels to SCC in Argon, synthetic flue gas and synthetic flue gas with 0.2 Vol.% HCl at 540°C was performed. Sulphidation induced cracking of the 1 1/4% Cr - 1/2% Mo steel in flue gas and flue gas with hydrogen chloride additions was observed over strain rates (ϵ) of 10^{-4} to 10^{-6} sec^{-1}. By comparison, the 2 1/4% Cr - 1% Mo steel displayed an immunity to cracking in flue gas but addition of a chloride environment produced degradation at $\epsilon = 10^{-6}$. The mechanical behaviour of the alloys is discussed in regard to the scale morphology. 5 figures, 1 table.

23911 (CONF-810913—Vol.1, pp 181-192) **Effect of retrogression and reaging treatment on the stress corrosion cracking susceptibility 7075-T6 aluminum alloy.** Webb, G.L. (Oklahoma State Univ., Stillwater); Murali, J.; Liley, J.D. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Aluminum alloys such as 7075 are known to be highly susceptible to stress corrosion cracking in the peak aged condition or the T6 temper. Overaging to T73 or T76 tempers is known to alleviate the stress corrosion cracking susceptibility but with a loss in strength of up to 15 percent. A retrogression and reaging treatment (RRA) is claimed to provide resistance to stress corrosion cracking without loss of strength. The benefits of the RRA treatment with regard to stress corrosion cracking resistance of 7075 A1 are examined by a series of experiments. Implications of the results to proposed mechanisms of stress corrosion cracking of aluminum alloys are discussed. 5 figures, 2 tables.

23912 (CONF-810913—Vol.1, pp 193-199) **Stress corrosion of type 304 steel in H_2SO_4 alkali halide environments.** Eliezer, D.; Pinkus, P.; Itzhak, D. (Ben Gurion Univ. of the Negev, Beer Sheva, Israel). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The influence of alkali halide additions (NaF, Nacl, NaBr, NaI) on the corrosion and stress corrosion cracking (SCC) of type 304 stainless steel in different concentration of H_2SO_4 at room temperature has been investigated. U-Bend tests, Potentiodynamic measurements and fractographic observation were employed. SCC was not observed in $1NH_2SO_3$ solutions but was observed in NH_2SO_3 + 1NNacl and in $5NH_2SO_4$ + 1NHaBr solutions. Additions of alkali-halide salts to $1NH_2SO_4$ + 1NNaBr corrosion rate in the following order; Nal, NaBr, Nacl and NaF. Based on our observations a new modified tunneling model is suggested, in $5NH_2SO_4$ containing NaBr. According to the suggested model the main crack

is formed only by anodic dissolution which caused the tunnels to propagate parallel to the surface. Addition of 1NNaI to $5NH_2SO_4$ inhibits SCC and the overall corrosion process mainly by cathodic inhibition mechanism. 4 figures, 1 table.

23913 (CONF-810913—Vol.1, pp 201-209) **Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities.** Shiga, S.; Hoshino, M. (Furukawa Electric Co., Nikko, Japan). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

In order to elucidate the environmental aspects of α-brass stress corrosion cracking (SCC), around 200 chemical compounds were tested in aqueous solutions, where deeply drawn cups of yellow brass were dipped and visually checked to evalute SCC-activity rated in terms of time to cracking. Major findings and understandings are as follows: (1) On the molecular structure basis, SCC media are grouped into four categories of NH_3 and its derivatives, chelatecompounds, cations of metals nobler than Zn and polyethers, the last of which was totally found out in this study. (2) Having similarities in part, polyethers are differentiated from the conventional in their negligible corrosiveness and prominent sensitiveness to stress and structural conditions. Localized dezincification attack is reasoned to play a major role. This is also demonstrated in case of metal cations such as Pb^{2+}. (3) Many of polyethers are indespensable ingredients of detergents, coolants, sealants, solvents and so on, commercial samples of which were confirmed to induce SCC. Activity of Pb^{2+} is important relating to soldering.

23914 (CONF-810913—Vol.1, pp 211-225) **Analysis of a heat-transfer fluid fill pipe failure.** Winter, J.R. (Tennessee Eastman Co., Kingsport). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Failure analysis can be a very demanding endeavor that requires a great deal of interdisciplinary assistance if the correct solution to a particular problem is to be found. This paper presents an example that shows the need for interdisciplinary interaction in determining the cause of failures. It also points out the need for the engineer to be aware of the limitations of the methods and/or boundary conditions he is employing. In addition, it is shown that conservative design oriented procedures cannot be employed in failure analysis since they generally lead to erroneous conclusions. The merits of the finite element method in accurately simulating real life problems is also vividly brought to the forefront. In the example presented in this paper, cracks were developing along a pipe weld. After discarding several possible causes for the failures, it was finally determined that the problem was due to stress-corrosion-cracking associated with a rather unusual and novel environmental condition and differential thermal expansion. 9 figures.

23915 (CONF-810913—Vol.1, pp 229-244) **Metallographic and fractographic aspects of liquid-metal embrittlement.** Lynch, S.P. (Dept. of Defense, Melbourne, Australia). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The effects of liquid-metal environments on fracture in several materials (aluminium alloys, nickel alloys, and high-strength steels) have been studied using metallographic and fractographic techniques. Mechanisms of fracture are discussed in the light of these observations. In some cases, crack growth in liquid-metal environments was associated with considerable plasticity and produced entirely dimpled fracture surfaces; however, plastic zones were smaller and dimples were shallower than those associated with fracture in inert environments. In other cases, plastic flow was very localised and fracture surfaces were relatively flat except for tear ridges, isolated large dimples, and, perhaps, extremely small, shallow dimples. For those cases of liquid-metal embrittlement where extensive plasticity occurs, it is concluded that fracture is accomplished entirely by plastic flow and involves nucleation and growth of voids ahead of cracks. Furthermore, it is proposed that adsorption of liquid-metal atoms at the crack tip reduces the (shear) strength of interatomic bonds and, hence, facilitates the nucleation of dislocations at crack tips. For those cases of liquid-metal embrittlement where plasticitiy is extremely localised, it is difficult to differentiate between crack growth accomplished by plastic flow and crack growth by tensile separation of atoms at crack tips (facilitated by adsorption) although the former is considered more probable. 12 figures.

23916 (CONF-810913—Vol.1, pp 245-255) **Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys.** Ashok, S.; Slavin, T.; Stoloff, N.S.; Glicksman, M.E. (Rensselaer Polytechnic Inst., Troy, NY). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Tensile and bend properties of nickel and iron-base amorphous alloys have been studied at 200°C in the presence of liquid lithium and in air. Nickel base alloys show severe embrittlement, except for Metglas 2826MB. The results are discussed on the basis of proposed mechanisms of liquid metal embrittlement and it is concluded that the embirttlement of amorphous alloys takes place by an enhancd shear mechanism. Hydrogen embrittlement also seems to occur by a similar process. 6 figures, 2 tables.

23917 (CONF-810913—Vol.1, pp 257-265) **Tensile and fracture toughness behavior of AISI 4130 steel in the presence of eutectic Pb-Sn solder.** Rack, H.J. (Exxon Enterprises, Greer, SC); Munford, J.W.; Lutz, T.J. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The influence of an eutectic Pb-Sn solder environment on the tensile and fracture toughness behavior of quenched and tempered 4130 steel has been examined. The results indicate that the tensile ductility and fracture toughness of this alloy are drastically reduced in molten Pb-Sn eutectic solder relative to that observed in an inert environment. While the tensile ductility again increases at temperature above 750°K, the fracture toughness in molten solder remains low over the temperature range examined. These results are consistent with and lend support to the suggestion that the upper temperature end of the tensile ductility trough normally observed in metal-induced embrittlement studies is controlled by crack initiation processes. 5 figures.

23918 (CONF-810913—Vol.1, pp 269-280) **Radiation effects in metallic alloys.** Nichols, F.A. (Argonne National Lab., IL). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

A general survey is presented of radiation-induced changes in metallic alloys, especially those changes of technological interest in engineering alloys. The present level of theoretical understanding and of empirical correlation procedures is discussed. 51 references.

23919 (CONF-810913—Vol.1, pp 281-291) **Effect of neutron irradiation on dynamic fracture toughness of A533 Grade B Class 1 pressure vessel steel .** Murty, K.L. (Westinghouse Research and Development Center, Pittsburgh, PA); Shogan, R.P.; Bamford, W.H. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The effect of neutron radiation on fracture characteristics of an A533 Grade B Class 1 pressure vessel steel was investigated using standard and instrumented precracked Charpy impact tests. Use of the instrumented impact test with precracked specimens has allowed fracture toughness values to be determined from the Charpy test. Neutron exposure resulted in minute decreases in the upper shelf Charpy energy and fracture toughness, and an increase in the ductile brittle transition temperature (DBTT). The Charpy transition temperature shifted ~ 46°F while the fracture toughness shift was only 25°F. The temperature variation of the dynamic yield strength exhibited dips at DBTT for both unirradiated archive and irradiated materials. 6 figures.

23920 (CONF-810913—Vol.1, pp 293-302) **Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours.** Cox, B.; Surette, B.A.; Wood, J.C. (Atomic Energy of Canada Ltd., Chalk River, Ontario). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Experience gained from in-reactor failures of Zircaloy-clad fuel is used to characterize those features of the pellet-clad interaction (PCI) process which must be explained by any proposed mechanism. It is shown that most of the observed features can be explained by an iodine-induced (stress corrosion cracking (SCC) mechanisms. Recent results obtained by laboratory testing in Cs/Cd vapour mixtures show that most of the observed features can also be explained by a metal vapour embrittlement process. Minor differences between the two processes still lead to a small preference for iodine as the active fission product in PCI failures. Further work on predicting in-reactor behaviour on the basis of laboratory data on the kinetics of iodine-induced SCC should take into account the different kinetics of the Cs/Cd cracking process, and the possibility that these rather than iodine are the active fission products. It may be that both mechanisms can operate depending upon local circumstances. 10 figures, 1 table.

23921 (CONF-810913—Vol.1, pp 303-312) **Oxidation-induced dimensional changes in zircaloy cladding tubes.** Hammad, F.H.; Aly, A.E.; El-Raghy, S.M. (Nuclear Research Center, Cairo, Egypt). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The oxidation of some types of zircaloy tubing has been studied in air in the temperature range 500 to 1100°C. The consequential oxidation-induced dimensional changes of the tubes have been measured. Both radial and axial plastic deformation were observed. The induced radial strain (E/sub R/ was characterized by two stages, uniform radial expansion followed by nonuniform radial distortion. During the uniform deformation period, the radial strain kinetics followed the oxidation pattern, expressed as E/sub R/ = $kt^{0.5}$. However the induced strain per unit thickness of oxide film was not the same for thedifferent types of investigated tubing. The highest uniform plastic increase in the diameter was 9.4%. The non-uniform radial deformation was recorded by metallography. The mean value of this non-uniform radial deformation was up to 27%. Oxidation of an axially slitted tube resulted in gradual opening of the slit one slitted tube was converted into a sheet by prolonged oxidation. This may be taken as a measure of the differences between stresses generated by oxidation of the inner and outer surface. The axial elongation (E/sub R/) was of the same order of magnitude of the radial strain (few percent). The longtidunal deformation was uniform and independent of the tubing length, a direct result of the uniform stressing by a uniform longitudinal growth of the oxide film.

23922 (CONF-810913—Vol.1, pp 313-320) **Environmental effects on elevated temperature fatigue crack propagation in Type 316 stainless steel for fusion reactor applications.** Michel, D.J.; Smith, H.H. (Naval Research Lab., Washington, DC). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The influence of a vacuum environment on fatigue crack propagation in type 316 stainless steel was investigated at elevated temperatures and compared with previous air data for continuous and hold time test conditions. The results indicate an environmental sensitivity to changes in the mode of failure and suggest that existing air data will be of value to fusion reactor design only when proper consideration is carefully given to service environment. 4 figures.

23923 (CONF-810913—Vol.1, pp 329-336) **Intergranular attack in Inconel 600 nuclear steam generator tubes.** Pement, F.W. (Westinghouse R and D Center, Pittsburgh, PA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Inlet end (hot leg) segments of 5 Inconel 600 steam generator tubes from 2, ~ 20-year-old, operating nuclear power plants were examined by metallography and microanalyses. Intergranular attack (IGA) affecting nearly all grain boundaries to significant fractions of the wall thickness was found at all locations in an annulus between the tube and the holes within the tube sheets, where ~600°F conditions prevailed. No IGA was detected above the tube sheet or on a cold leg tube (~50 to 60°F lower). Microanalyses revealed Na, K, S, P, Si, Al, and Ca. The results are discussed in terms of potentially localized high alkalinity which tests show can produce IGA or intergranular stress corrosion in Inconel, but the mechanism of IGAA is considered to be complex and unestablised; additional research is underway or planned. 10 figures.

23924 (CONF-810913—Vol.1, pp 351-367) **DEsign for elevated temperature environmetns: some current problems and concerns.** LeMay, I. (Univ. of Saskatchewan, Saskatoon, Canada). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Current problems and concerns relating to elevated temperature creep and design are reviewed, with emphasis on extrapolation procedures for prediction of long-term creep behavior from short time data; methods of predicting damage and remaining life in components; and creep-fatigue interaction. The importance of a sound mechanistic basis for phenomenological relations is noted, together with the need to quantify damage prediction and measurement and to take possible environmental interactions into account at the design stage. Finally, the importance of elevated temperature deformation studies being pursued on an interdisciplinary basis is pointed out. 6 figures.

23925 (CONF-810913—Vol.1, pp 383-392) **Influence of interfacial stresses on oxide scale adherence.** Sherwood, W.; Shatynski, S.R. (Rensselaer Polytechnic Inst., Troy, NY). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Interfacial stresses incurred upon oxide scale growth can either enhance or degrade oxide scale adherence. These interfacial stresses result from mechanical constraints of the sample and the difference in the coefficients of thermal expansion between the

oxide and the metal. Experiments were performed on three steels: types 1018, 304, and 430. The adherence was measured using a controlled water spray quench. These results were correlated with metallographic observation. An estimated interfacial stress can then be calculated from the oxide metal geometry and the measured adherence. The influence of alloying elements on the oxide adherence was shown to be not simply related to interfacial stresses but is a strong function of the alloy microstructure. 5 figures, 3 tables.

23926 (CONF-810913—Vol.1, pp 393-405) **Effect of trace alloying additions on the high-temperature oxidation of Al-4.2 wt % Mg and Al-3 wt % Li alloys.** Field, D.J. (Alcan International Ltd., Oxon, England); Scamans, G.M.; Butler, E.P. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The high-temperature oxidation of Al-Mg and Al-Li alloys is characterised by the rapid formation of thick crystalline oxide films, and problems are experienced during melting, casting, scrap-recycling and heat treatment. Furthermore, at each stage of fabrication these oxides have to be removed prior to further processing. Initial oxidation of these alloys takes place by the nucleation and growth of primary crystalline oxides at the oxide/metal interface and the formation of secondary oxides by the reduction of the original amorphous film of γ-Al_2O_3 by Mg and Li. Subsequent oxidation is dominated by the further nucleation and growth of primary oxides. These processes can be modified on Al-Mg alloys by the presence of trace alloying additions. For example, the addition of 100 ppM of Be or Ca to Al-4.2% Mg will reduce the expected oxidation weight gain by a factor of 10. The present paper seeks to clarify the underlying mechanisms and role of trace additions in the oxidation of Al-Mg and Al-Li alloys. 8 figures

23927 (CONF-810913—Vol.1, pp 407-415) **Corrosion of superheaters and reheaters in fossil fired boilers.** French, D.N. (Riley Stoker Corp., Worcester, MA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The corrosion of superheaters and reheaters in fossil fired boilers can be related to both fire and steam side conditions. Oil fueled boilers exhibit ash corrosion by low melting point slags of vanadium, sodium, and sulfur oxides, coal fired boilers by complex sulfates. In both cases, increasing tube metal temperature exacerbates corrosion rates. On the inside of the tube, steam reacts with steel to form iron oxide, an insulating layer which reduces heat transfer. The net effect is increased tube metal temperture. A heat flow analysis is presented that relates overall heat transfer, boiler design parameters, the internal scale thickness, and tube metal temperature. Case histories of oil and coal ash corrosion failures are interpreted in light of the current understanding. 3 tables, 6 figures.

23928 (CONF-810913—Vol.1, pp 417-425) **Microstructural degradation in boiler steels.** French, D.N. (Riley Stoker Corp., Worcester, MA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Steam generating equipment is designed to operate at elevated temperatures for 25 years or so. Materials used in construction are plain carbon steels, low alloy steels (C - 1/2 Mo, 1 1/4 Cr - 1/2 Mo, 2 1/2 Cr - 1 Mo), and stainless steels. Microstructures of ferritic steels will develop, depending on time and temperature, spheroidized carbides or graphite and ferrite. Stainless steels can form sigma phase and carbide precipitates. Abnormal temperature excursions can lead to premature failure. Depending on the peak temperature at the time of the rupture, and the cooling rate, the resulting microstructures will show remarkable variability. Structures of martensite; bainite; Widmanstatten morphology; graphite and ferrite; and graphite, martensite, and ferrite are possible. Using actual case histories of boiler tube failures as examples, a portfolio of these unusual microstructures is presented and interpreted. 16 figures, 1 table.

23929 (CONF-810913—Vol.1, pp 557-563) **Stress corrosion cracking: a continuum formulation.** Gerberich, W.W.; Aifantis, E.C. (Univ. of Minnesota, MN). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098. Contract AC02-79ER10450.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

A method is suggested to extend discrete stress corrosion cracking findings to continuum modeling. In the discrete model a single crack is placed in the interior of a stressed infinite plate and a condition is deduced for the velocity of the crack in terms of the globally applied stress intensity factor. In the continuum model a continuous distribution of cracks is assumed and an average crack length and a local stress intensity factor are properly defined pointwise throughout the body. It is then postulated that the average crack velocity is related to the local stress intensify factor as in the discrete case. This relationship is central in defining an inelastic strain due to the cracks extension and influences directly the form of the macroscopic stress-strain law which is so constructed as to reflect the aforementioned process of internal microcracking.

23930 (CONF-810913—Vol.1, pp 585-591) **Coupled stress-concentration spinodals.** Unger, D.J.; Aifantis, E.C. (Univ. of Minnesota, Minneapolis). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098. Contract AC02-79ER10450.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Spinodal and nucleation may be viewed as phase separation processes which play an important role in defining centers about which subsequent degradation processes (e.g. plastic deformation, corrosion, etc.) can be localized. Recently Aifantis has shown how a coupled concentration-stress spinodal decomposition theory can be obtained within a simple nonlocal mechanical framework. In addition to containing Cahn's thermodynamic theory, the mechanical approach derives a set of coupled differential equations for the concentration and deformation. An elementary one-dimensional example is chosen to illustrate the coupled theory by deriving solutions not only for the concentration but also the displacement and stress, by showing how a mechanical fluctuation (e.g. a mechanical body force) induces spinodal, and by investigating the effect of possible inertia associated with the deformation process on the stability of the system.

23931 (CONF-811145—18) **Segregation in irradiated titanium alloys.** Wang, Z.; Ayrault, G.; Wiedersich, H. (Argonne National Lab., IL (USA)). Nov 1981. Contract W-31-109-ENG-38. 25p. NTIS, PC A02/MF A01. Order Number DE83007796.

From International conference on neutron irradiation effects; Argonne, IL, USA (9 Nov 1981).

Portions are illegible in microfiche products.

Radiation-induced segregation of V, Al and Mo in α-phase titanium alloys was investigated. Ion irradiation (2.1-MeV Ar^+) at 650°C was used to simulate elevated-temperature neutron irradiation effects. Solute segregation in the near-surface regions of irradiated Ti-6Al-4V, Ti-8Al-1V-1Mo, Ti-3V and Ti-8.71Al was measured with an Auger depth profiling technique. The depth profiles showed evidence of radiation-induced V, Mo and Al segregation toward sample surfaces. This is in accord with a solute size effect. 6 figures.

23932 (CONF-811150—13) **Ion-bombardment-induced subsurface composition modifications in alloys at elevated temperatures.** Lam, N.Q.; Wiedersich, H. (Argonne National Lab., IL (USA)). Nov 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007855.

From Yamada conference on point defects and defect interactions in metals; Kyoto, Japan (16 Nov 1981).

Modifications of subsurface alloy composition during high-temperature sputtering were studied using a comprehensive kinetic model that includes Gibbsian adsorption, preferential sputtering, displacement mixing, radiation-enhanced diffusion, and radiation-induced segregation. Numerical solutions were obtained for a Cu-40 at. % Ni alloy under 5-keV Ar^+ ion bombardment as functions of time and temperature. The model predictions are in good qualitative agreement with recent experimental measurements.

23933 (CONF-811150—14) Vacancy formation in Ni and Ni(Ge). Smedskjaer, L.C.; Fluss, M.J.; Legnini, D.G.; Chason, M.K.; Siegel, R.W. (Argonne National Lab., IL (USA)). Nov 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007649.

From Yamada conference on point defects and defect interactions in metals; Kyoto, Japan (16 Nov 1981).

Portions are illegible in microfiche products.

Vacancy formation in Ni and Ni(1 at% Ge) was studied under thermal equilibrium conditions using positron annihilation Doppler-broadening. A monovacancy formation enthalpy of 1.8 +- 0.1 eV was determined for pure Ni; combining this result with those from previous tracer self-diffusion measurements, a monovacancy migration enthalpy of 1.1 +- 0.1 eV was also deduced. An effective vacancy formation enthalpy of 1.4 eV was found for Ni(1 at% Ge). Using a model to simulate the free and bound-vacancy ensemble in the alloy, a value of 0.7 eV was obtained for the formation enthalpy of Ge-bound vacancies. The results are compared with previous theoretical and experimental results. 3 figures.

23934 (CONF-811150—15) Molecular-dynamics simulation of displacement cascades in Cu: analysis of replacement sequences. King, W.E.; Benedek, R. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007794.

From Yamada conference on point defects and defect interactions in metals; Kyoto, Japan (16 Nov 1981).

Portions are illegible in microfiche products.

Molecular-dynamics computer simulations of displacement cascades in copper have been performed for recoil energies up to 450 eV. Statistical analyses of the atomic replacements are presented. Linear replacement sequence lengths are extremely short on the average. The effect of the cooling phase of the cascade is discussed.

23935 (CONF-811150—16) Re-examination of the threshold energy surface in copper. King, W.E.; Benedek, R.; Merkle, K.L.; Meshii, M. (Argonne National Lab., IL (USA); Northwestern Univ., Evanston, IL (USA). Dept. of Materials Science and Engineering). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007793.

From Yamada conference on point defects and defect interactions in metals; Kyoto, Japan (16 Nov 1981).

Portions are illegible in microfiche products.

Radiation-induced defect production in copper has been studied using in-situ electrical resistivity damage-rate measurements in the HVEM and molecular dynamics simulations. Analysis of the results yields a threshold energy surface characterized by two isolated pockets of low threshold energy centered at <100> and <110> surrounded by regions of much higher threshold energy; the corresponding damage function exhibits a plateau at 0.65 Frenkel pairs. A Frenkel pair resistivity of (2.75/sub -0.2/$^{+0.6}$) x 10^{-4} Ω-cm is proposed. A model damage function is constructed and compared to results from ion irradiation damage-rate measurements. 7 figures.

23936 (CONF-811150—17) Atomic defects and diffusion in metals. Siegel, R.W. (Argonne National Lab., IL (USA)). Nov 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007774.

From Yamada conference on point defects and defect interactions in metals; Kyoto, Japan (16 Nov 1981).

Portions are illegible in microfiche products.

The tracer self-diffusion data for fcc and refractory bcc metals are briefly reviewed with respect to (i) the available monovacancy formation and migration properties and (ii) the high-temperature diffusion enhancement above that expected for mass transport via atomic exchange with monovacancies. While the atomic-defect mechanism for low-temperature self-diffusion can be reliably attributed to monovacancies, the mechanisms responsible for high-temperature mass transport are not so easily defined at this time; both divacancies and interstitials must be seriously considered. Possibilities for improving our understanding in this area are discussed. 68 references, 7 figures.

23937 (CONF-811150—18) Electronic structure and formation energy of a vacancy in aluminum. Chakraborty, B.; Siegel, R.W. (Argonne National Lab., IL (USA)). Nov 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007689.

From Yamada conference on point defects and defect interactions in metals; Kyoto, Japan (16 Nov 1981).

Portions are illegible in microfiche products.

The electronic structure of a vacancy in Al was calculated self-consistently using norm-conserving ionic pseudopotentials obtained from ab initio atomic calculations. A 27-atom-site supercell containing 1 vacancy and 26 atoms was used to simulate the environment of the vacancy. A vacancy formation energy of 1.5 eV was also calculated (cf. the experimental value of 0.66 eV). The effects of the supercell and the nature of the ionic potential on the resulting electronic structure and formation energy are discussed. Results for the electronic structure of a divacancy are also presented. 3 figures.

23938 (CONF-820205—6) Crack and cavity nucleation at interfaces during creep. Yoo, M.H.; Trinkaus, H. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 62p. NTIS, PC A04/MF A01. Order Number DE83007513.

From 111. AIME annual meeting; Dallas, TX, USA (14 Feb 1982).

Athermal nucleation of microcracks and thermal nucleation of cavities during creep deformation are reviewed with an emphasis on effects of solute segregation to grain boundaries and cavity surfaces. The magnitude and the duration of stress concentration at a triple grain junction or at a grain-boundary inclusion are estimated for transient Coble creep and steady state power-law creep conditions. Stable configurations of wedge-type microcracks are predicted by a Griffith-like crack model. The rate for thermal nucleation of cavities is obtained by the Fokker-Planck equation for vacancy clusters. Cracks and cavities are interdependent, and cavity nucleation occurs continuously throughout the three creep stages. The local stress concentration enhances microcrack and cavity nucleation. The cavity nucleation rate is generally increased as a result of solute segregation to the surfaces and interfaces. Immobile solute or trace elements affect the nucleation rate by changing the grain-boundary diffusivity. Mobile solutes or impurities having high vapor pressure enhance cavity nucleation by creating an internal pressure. Experimental techniques for quantitative analyses of cavity-nucleation processes are discussed.

23939 (CONF-820274—2) Positron-annihilation spectroscopy of vacancy defects in aluminum. Chakraborty, B.; Berko, S.; Fluss, M.J.; Hoffmann, K.; Lippel, P.; Siegel, R.W. (Argonne National Lab., IL (USA); Brandeis Univ., Waltham, MA (USA). Dept. of Physics). Jun 1982. Contract W-31-109-ENG-38. 17p. NTIS, PC A02/MF A01. Order Number DE83007628.

From 2. national symposium on positron annihilation; Madras, India (8 Feb 1982).

Portions are illegible in microfiche products.

Positron-annihilation characteristics in a monovacancy and a divacancy in aluminium have been calculated self-consistently using a local density functional formalism, into which the many-body enhancement effects have been incorporated. Results for the theoretical two-dimensional angular correlation of annihilation radiation spectra are compared to experimental results obtained from an aluminum single crystal at 20°C, where positrons annihilate from a Bloch-state, and at higher temperatures, 500°C and 630°C, where they annihilate primarily from vacancy-trapped states.

23940 (CONF-820434—17) Positron annihilation in solid and liquid Ni. Fluss, M.J.; Smedskjaer, L.C.; Chakraborty, B.; Chason, M.K. (Argonne National Lab., IL (USA)). Mar 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83007820.

From 6. international conference on positron annihilation; Arlington, TX, USA (3 Apr 1982).

Portions are illegible in microfiche products.

New techniques have been developed for the study of metals via positron annihilation which provide for the in-situ melting of the samples and subsequent measurements via Doppler broadening of positron-annihilation radiation. Here we report these metods currently in use at our laboratory; ion implantation of ^{58}Co and the use of Al_2O_3 crucibles for in-situ melting followed by the decomposition of the Doppler-broadened spectrum into a parabolic and a Gaussian component. Our earliest results obtained for pure Ni in the polycrystalline solid and in the liquid state are compared. An interesting similarity is reported for the distributions of the high-momentum (Gaussian) component for positrons annihilating in vacancies at high temperatures and those annihilating in liquid Ni.

23941 (CONF-820434—18) Positron-annihilation measurements of vacancy formation in Ni and Ni(Ge). Smedskjaer, L.C.; Fluss, M.J.; Legnini, D.G.; Chason, M.K.; Siegel, R.W. (Argonne National Lab., IL (USA)). Mar 1982. Contract W-31-109-ENG-38. 4p. NTIS, MF02/MF A01. Order Number DE83007969.

From 6. international conference on positron annihilation; Arlington, TX, USA (3 Apr 1982).

Portions are illegible in microfiche products.

Vacancy formation in Ni and in dilute Ni(Ge) alloys was studied under thermal equilibrium conditions using positron-annihilation Doppler broadening. A monovacancy formation enthalpy of 1.8 +- 0.1 eV was determined for pure Ni; combining this result with that from previous tracer self-diffusion measurements, a monovacancy migration enthalpy of 1.1 +- 0.1 eV was also deduced. Analysis of the vacancy formation measurements in Ni(0.3 at.% Ge) and Ni(1 at.% Ge) yielded a value for the vacancy-Ge binding enthalpy of 0.20 +- 0.04 eV.

23942 (CONF-820434—19) Positron-annihilation study of the equilibrium vacancy ensemble in aluminum. Fluss, M.J.; Berko, S.; Chakraborty, B.; Hoffmann, K.; Lippel, P.; Siegel, R.W. (Brandeis Univ., Waltham, MA (USA). Dept. of Physics; Argonne National Lab., IL (USA)). Jun 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007623.

From 6. international conference on positron annihilation; Arlington, TX, USA (3 Apr 1982).

Portions are illegible in microfiche products.

A preliminary report is presented of a positron-annihilation study of the equilibrium vacancy ensemble in aluminum using one- and two-dimensional angular correlation of annihilation radiation (ACAR) measurements versus temperature. The annihilation characteristics of a positron from the Bloch state, and the monovacancy- and divacancy-trapped states have been calculated self-consistently within a supercell, including many-body enhancement effects, and are compared with experiment. 4 figures.

23943 (CONF-820628—22) Surface segregation in concentrated Ni-Cu alloys under irradiation. Wagner, W.; Naundorf, V.; Rehn, L.E.; Wiedersich, H. (Argonne National Lab., IL (USA); Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.)). May 1982. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83007678.

From 11. international symposium on effects of radiation on materials, American Society for Testing and Materials; Scottsdale, AZ, USA (28 Jun 1982).

Portions are illegible in microfiche products.

Radiation-Induced Segregation (RIS) has been investigated in concentrated Ni-Cu alloys (Ni-10 at % Cu and Ni-60 at % Cu) is a temperature range between 470 and 610°C. Depth profiling using Auger Electron Spectroscopy (AES) as well as in situ Rutherford Backscattering Spectrometry (RBS) revealed significant segregation of Ni to the surface during ion irradiation. The width of the segregated region was found to increase with increasing temperature, extending to ~ 170 nm at 610°C. A post irradiation annealing experiment is presented to show that the segregation is radiation-induced. The results are discussed in the framework of current models of RIS with the aim of identifying the possible origin of the segregation. 5 figures.

23944 (CONF-820659—8) Superconductivity in Au-Cr-Au and Ag-Pd-Ag epitaxial metal film sandwiches. Brodsky, M.B.; Hamaker, H.C. (Argonne National Lab., IL (USA)). Jul 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007608.

From 4. conference on superconductivity in d- and f-band metals; Karlsruhe, F.R. Germany (28 Jun 1982).

Portions are illegible in microfiche products.

Thin layers (1-2 nm) of Cr and Pd have been grown in Epitaxial Metal Film Sandwiches (EMFS) with Au or Ag, respectively. Half of the Au-Cr-Au samples and one Ag-Pd-Ag sample were superconductors. Cr grows in an fcc structure and Pd is in a stretched lattice, as was observed for Au-Pd-Au. Highest observed T/sub c/'s are 3.00°K for Au-Cr-Au and 2.15°K for Ag-Pd-Ag. All nonsuperconducting samples exhibit resistivity minima due to local moments. Large orbital contributions to H/sub c/$_2$ are observed: 42 kOe/K for Au-Cr-Au and 71 kOe/K for Ag-Pd-Ag being measured with T/sub c/'s $\approx$ 1 K. These results agree with calculated values derived from the resistivities and a N(E/sub F/) for fcc Cr of 2.1 states/eV. The results are discussed relative to preliminary data for Au-V-Au and Ag-V-Ag EMFS. 8 figures.

23945 (CONF-820659—9) Soft phonon modes and superconductivity in C-15 compounds. Knapp, G.S.; Georgopoulos, P.; Freeman, A.J.; Jarlborg, T.; Pan, H.K. (Argonne National Lab., IL (USA); Northwestern Univ., Evanston, IL (USA). Dept. of Physics; Wisconsin Univ., Madison (USA)). 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83008623.

From 4. conference on superconductivity in d- and f-band metals; Karlsruhe, F.R. Germany (28 Jun 1982).

Results of EXAFS measurements of lattice properties (effective Debye temperatures and force constants, K/sub nu/) and self-consistent energy band determinations of electronic properties (phase shifts and l projected DOS) are presented for TaV_2 and HfV_2. These are combined to calculate the superconducting property, λ, using the rigid ion approximation and the McMillan equation. High λ (2.0) and T/sub c/ values obtained for HfV_2 would arise from the greatly reduced K/nu/ values and the increased DOS if the lattice phase transition at T = 113K did not occur.

23946 (CONF-820776—1) Band model for d- and f-metals. Koelling, D.D. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 96p. NTIS, PC A05/MF A01. Order Number DE83008658.

From NATO Advanced Study Institute conference on the electronic structure of complex systems; Gent, Belgium (12 Jul 1982).

Portions are illegible in microfiche products.

The application of band theory to metallic systems with d- and f-orbitals in the valence and conduction bands is discussed. Because such an application pushes theory and technique to their limits, several important features are briefly recapitulated. Within the transition metal systems, the elemental systems are used to discuss the fundamental formalism being applied and the newer directions into more complex systems are mentioned. Here we focus more on anisotropic properties and Fermi surface properties. Within the f-orbital systems, the focus is more on Ce and its compounds because of current interest with a relatively brief discussion of the actinides. the point of view advanced, however, has its origins in actinide research.

23947 (CONF-820929—12) Fermi-surface properties of $CeSn_3$ and related compounds. Johanson, W.R.; Crabtree, G.W.; Edelstein, A.S.; McMasters, O.D. (Argonne National Lab., IL (USA); Illinois Univ., Chicago (USA); Ames Lab., IA (USA)). 1982. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83008606.

From IUPAP international conference on magnetism; Kyoto, Japan (6 Sep 1982).

The Fermi-surface properties of the coherent and incoherent forms of the dense Kondo and mixed-valence models for anomalous Ce compounds are examined. Experimental Fermi-surface data for $CeSn_3$ and its isostructural, non-4f analog $LaSn_3$ are presented and found to be consistent with either a coherent mixed valence or Kondo lattice interpretation. For $CeSn_3$, one-electron band calculations of the Fermi surface geometry are in good agreement with experiment, but the calculated effective masses are too low.

23948 **(CONF-821049—18) Threshold energy surface and Frenkel-pair resistivity for Cu.** King, W.E.; Merkle, K.L.; Meshii, M. (Argonne National Lab., IL (USA); Northwestern Univ., Evanston, IL (USA)). 1982. Contract W-31-109-ENG-38. 40p. NTIS, PC A03/MF A01. Order Number DE83008694.

From TMS/AIME fall meeting(Radiation damage analysis for fusion reactors); St. Louis, MO, USA (24 Oct 1982).

In-situ electrical resistivity damage-rate measurements in the high voltage electron microscope have been used to study electron-irradiation-induced defect production in copper single crystals at T < 10°K. Analysis of the directional and energy dependence yields a threshold energy surface that is significantly different from those of previous investigations: two pockets of low threshold energy centered at <100> and <110> surrounded by regions of much higher threshold energy. The corresponding damage function exhibits a plateau of 0.6 Frenkel pairs. the present results imply a Frenkel pair resistivity for C of (2.75/sub -0.2//sup +0.6/) x Ω-cm.

23949 **(CONF-8209106—1) Magnetic-property changes in epitaxial metal-film sandwiches.** Brodsky, M.B. (Argonne National Lab., IL (USA)). Aug 1982. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83007664.

From 10. international colloquium on magnetic films and surfaces; Yokohama, Japan (13 Sep 1982).

Epitaxial metal-film sandwiches (EMFS) containing Pd or Cr, have been prepared between single-crystal Ag or Au. The modified Pd/Cr show major changes in physical properties. Pd has a stretched lattice parameter in Au-Pd-Au, which combines with a tetragonal distortion to cause exchange enhancements up to 28,000 and spin-fluctuation temperatures of 1 to 10 K. In Au-Cr-Au, Cr takes up the fcc structure, leading to superconductivity due to a high N(E/sub F/). These results are contrasted to data for Ag-Pd-Ag and Ag-Cr-Ag EMFS.

23950 **(DOE/ER/04461—3) Micromechanical modeling of microstructural damage in creeping alloys. Progress report, March 1, 1982-February 28, 1983.** Argon, A.S.; McClintock, F.A. (Massachusetts Inst. of Tech., Cambridge (USA)). 1 Mar 1983. Contract AC02-77ER04461. 54p. NTIS, PC A04/MF A01. Order Number DE83009248.

Portions are illegible in microfiche products.

The progress in research carried out over the past 11 months under this program is described along two related thrusts: on Intergranular Cavitation, and Crack Growth and Macro-Fracture. This research which is partly accomplished and partly still in progress is described in some detail.

23951 **(DOE/ER/05002—32) Analysis of diffraction from [001] twist boundaries in cubic metals.** Brokman, A.; Balluffi, R.W. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Materials Science and Engineering). Feb 1983. Contract AC02-78ER05002. 35p. NTIS, PC A03/MF A01. Order Number DE83008757.

An analysis of the diffraction from [001] twist boundaries in cubic metals has been made using analytical methods. A relatively simple model for boundary structure involving rotational relaxations around O lattice elements in the boundary core was employed. The results yielded grain boundary diffracted intensity on a grain boundary diffraction lattice in reciprocal space. This lattice consisted of an array of line elements running parallel to the twist axis in a square pattern corresponding to the reciprocal lattice of the Coincidence Site Lattice lying parallel to the grain boundary plane. The analytical model predicted the presently available main features of experimentally observed diffracted intensities and also those obtained by computer simulation calculations and clearly revealed the physical origins of the diffraction effects. The generalization of the analytical model to include any type of boundary was indicated. 9 figures.

23952 **(DOE/ER/10907—2) Role of grain size on the brittle-to-ductile transition of the strongly ordered alloy Ni_3Al: report on progress during year-2.** Schulson, E.M. (Dartmouth Coll., Hanover, NH (USA). Thayer School of Engineering). 15 Mar 1983. Contract AC02-81ER10907. 37p. NTIS, PC A03/MF A01. Order Number DE83008961.

Portions are illegible in microfiche products.

Experiments have been performed to characterize the structure and the mechanical properties of polycrystalline Ni_3Al prepared by consolidating rapidly solidified powders. Results show that powders, as solidified, are fine grained (0.1 to 1.5 μm) and relatively structure free, but are only partially ordered. As consolidated, the material is again relatively structure free, but now the grains are larger (approximately 15 μm) and recrystallized. Particles are inhomogeneously distributed, and appear to impede grain growth. There is no evidence to suggest grain boundary segregation of elements other than sulfur. Grain refinement imparts marked hardening at low temperatures, but owing to the occurrence of boundary sliding imparts weakening at intermediate temperatures. Refinement also increases hardness, but has no significant effect on the rate of work hardening nor on the tensile elongation at low temperatures. At intermediate temperatures, grain refinement leads to enhanced ductility, owing to grain boundary sliding. Intergranular fracture is accompanied by localized plastic flow in excess of that which occurs throughout the bulk of the grain. 19 figures.

23953 **(DOE/NBM—3007960) Characterization of defects in metals by positron-annihilation spectroscopy.** Siegel, R.W. (Argonne National Lab., IL (USA)). Oct 1981. Contract W-31-109-ENG-38. 31p. NTIS, PC A03/MF A01. Order Number DE83007960.

Portions are illegible in microfiche products.

The application of positron-annihilation spectroscopy (PAS) to the characterization and study of defects in metals has grown rapidly and increasingly useful in recent years. Owing to the ability of the positron to annihilate from a variety of defect-trapped states in metals, PAS can yield defect-specific information which, by itself or in conjunction with more traditional experimental techniques, has already made a significant impact upon our knowledge regarding lattice defect properties in metals. This has been especially true for vacancy defets, as a result of the positron's affinity for lower-than-average electron-density regions in the metal. The physical basis for the positron annihilation techniques is presented in this paper; and the experimental techniques, lifetime, Doppler broadening, and angular correlation, are briefly described and compared with respect to the information that can be obtained from each of them. A number of examples of the application of PAS to the characterization of atomic defects and their agglomerates are presented. The particular examples, chosen from the areas of equilibrium vacancy formation and atomic-defect recovery, were selected with a view toward elucidating the particular advantages of PAS over more traditional defect-characterization techniques. Limitations of PAS are also pointed out. 98 references.

23954 **(GKSS—80/E/17) Chemisorptive discharge of hydrogen ions: An elementary step in hydrogen corrosion.** Knowles, T.R.; Appel, J.; Mertins, H.; Pfuff, M. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)). 1980. 34p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750374.

Hydrogen corrosion at metals is briefly surveyed, emphasizing the role of H_3O^+ discharge reactions at the metal-electrolyte interface. The central problem is to understand how properties of the metal and the electrolyte influence the rate of charge transfer. The most reactive electrode metals are also those known to form strong bonds with hydrogen, but previous theoretical work has ignored the influence of bond formation during discharge. Here we adapt the Anderson-Newns model of hydrogen chemisorption theory to charge transfer reactions with bonding and calculate the adiabatic energy surface in the Hartree-Fock approximation. Trends in the reaction rates have been deduced as functions of the various model parameters.

23955 **(HEDL-SA—2687-FP) Microstructural and microchemical comparisons of AISI 316 irradiated in HFIR and EBR-II.** Brager, H.R.; Garner, F.A. (Hanford Engineering Development Lab., Richland, WA (USA)). 1982. Contract AC06-76FF02170. 39p. (CONF-821049—20). NTIS, PC A03/MF A01. Order Number DE83008404.

From TMS/AIME fall meeting(Radiation damage analysis for fusion reactors); St. Louis, MO, USA (24 Oct 1982).

Portions are illegible in microfiche products.

This paper shows that swelling data for annealed AISI 316 provide insight concerning the role of helium on swelling. Additional insight has been obtained by a series of microstructural and microchemical examinations conducted on specimens of both annealed and cold-worked steel after irradiation in EBR-II and HFIR. At least in the range 500 to 750°C, the results of these studies show that helium's influence on swelling is manifested in the cavity density but not in the dislocation density or the major features of the microchemical evolution of the alloy matrix. The results also suggest that the influence of helium at high displacement levels is not strong on either the total swelling or the steady-state swelling rate.

23956 (HMI—373, pp 99) **Quadrupole interaction of ^{79}Kr in zinc at high temperatures.** Devare, H.G.; Haas, H.; Mahnke, H.E.; Menningen, M.; Semmler, W.; Sielemann, R.; Zeitz, W.D. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23957 (HMI—373, pp 100) **Temperature dependence of the EFG of ^{193}Tl in thallium metal.** Bertschat, H.H.; Dafni, E.; Broude, C.; Davidovsky, F.D.; Goldring, G.; Hass, M.; Schatz, G. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23958 (HMI—373, pp 101) **Hyperfine fields at ^{19}F in nickel in the critical region.** Bertschat, H.H.; Bonde-Nielsen, K.; Haas, H.; Menningen, M. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23959 (HMI—373, pp 102) **Hyperfine field at ^{22}Na in nickel.** Haas, H.; Grawe, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23960 (HMI—373, pp 102-103) **Local susceptibility of ^{63}Ni in palladium.** Bertschat, H.H.; Haas, H.; Mahnke, H.E.; Maier, K.H.; Zeitz, W.D. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23961 (HMI—373, pp 104-105) **Symmetry of an indium-vacancy complex in coldworked aluminium.** Mueller, H.G. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23962 (HMI—373, pp 105-106) **PAC investigation of the orientation of lattice defects in electron irradiated aluminium single crystals.** Butt, R.; Mueller, H.G.; Semmler, W. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23963 (HMI—373, pp 106-107) **Moessbauer investigation of defect trapping at ^{57}Co in coldworked aluminium.** Sassa, K.; Petry, W.; Vogl, G. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23964 (HMI—373, pp 108) **Investigation of interstitial trapping at the PAC probe ^{100}Pd in niobium.** Metzner, H.; Sielemann, R.; Klaumuenzer, S.; Butt, R.; Semmler, W. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23965 (HMI—373, pp 109-110) **Radiation damage in amorphous CuZr-alloys.** Rentzsch, S.; Klaumuenzer, S.; Schumacher, G.; Vogl, G. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23966 (HMI—373, pp 136) **4f instabilities of isolated Ce ions in elements.** Barth, H.J.; Luszik-Bhadra, M.; Netz, G.; Riegel, D. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23967 (HMI—373, pp 138) **4f spin dynamics for isolated mixed valent Ce ions in Th metal.** Luszik-Bhadra, M.; Barth, H.J.; Netz, G.; Riegel, D. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23968 (HMI—373, pp 139) **Concentration and temperature dependence of the 4f spin relaxation of isolated Nd and Ce ions in simple metals.** Riegel, D. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

23969 **(LALP—83-4) SESAME '83: report on the Los Alamos Equation-of-State Library.** (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 15p. NTIS, PC A02/MF A01. Order Number DE83008283.

The SESAME Equation-of-State (EOS) Library is a standardized, computer-based library of tables of thermodynamic properties and FORTRAN subroutines developed and maintained by the Equation-of-State and Opacity Group (T-4 Group) of the Theoretical Division of Los Alamos National Laboratory. The Library currently contains data for about 70 materials, including metals, minerals, polymers, mixtures, etc., as well as simpler atomic and molecular species. The EOS's for existing materials in the Library are upgraded when appropriate, and EOS's for new materials are added frequently. The Library is presently being offered to all interested users free of charge. The thermodynamic data stored in the Library include tables of pressure P and energy E (and also in some cases, of Helmholtz free energy A), each as a function of density p and temperature T. Besides total P, E, and A tables, in many cases separate P, E, and A tables of thermal electronic and ion (including zero point) contributions are available. The SESAME EOS Library also has opacity data. The lower temperature limit on the opacity data is about 1 eV. The Library includes Roesseland mean opacities, thermal and electrical conductivities, and mean ion charges for elements intended for astrophysical applications (that is, for elements with atomic number $Z \leq 30$).

23970 (LBL—13588) Moessbauer spectrometry study of Fe-Ni-X alloys. Fultz, B.T. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 369p. NTIS, PC A16/MF A01. Order Number DE83008397.

Portions are illegible in microfiche products; Thesis.

The Moessbauer effect was used for obtaining microstructural and microchemical information about two-phase tempering of Fe-9Ni alloys. Moessbauer spectra from many high purity materials with known compositions and thermomechanical processings were obtained by a calibration program. Martensite solute concentration changes were then determined from Moessbauer spectra obtained after tempering. This thesis attempts to cover the fundamental background material underlying the use of the Moessbauer effect for chemical analysis of ternary Fe-9Ni-1X alloys. A picture of electronic effects around solute atoms is presented in order to justify a semi-phenomenological model of linear response of hyperfine magnetic field perturbations to magnetic moments. Some formal development of this model allowed estimates of hyperfine structure to be made for non-dilute binary and ternary alloys. The temperature-dependent effects of Ni solutes on the shapes of Moessbauer peaks from binary Fe-9Ni alloys are analyzed within this model. The effects of ternary X solutes on Moessbauer spectra of Fe-9Ni-X alloys are also successfully estimated. Sensitive difference spectrum procedures were eventually developed so that +-0.03% concentration changes of many ternary solutes in martensite could be measured. The austenite formed by a nucleation and growth mechanism. Ni, Mn, Cr, and Si were found to segregate to the austenite. The addition of ternary solutes to a Fe-9Ni matrix had substantial effects on the rate of austenite formation and its stability against the martensite transformation. The austenite phase boundary was found to move towards lower Ni concentrations as some ternary solutes segregated to the austenite. The relative diffusivity of Ni versus that of the other solutes was largely responsible for determining the balance of solute concentrations in the austenite.

23971 (LBL—14748) Development of ferritic weldments for grain-refined ferritic steels for 4.2K service. Kim, H.J. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 135p. NTIS, PC A07/MF A01. Order Number DE83009059.

Thesis.

The weldability of grain-refined ferritic nickel steels designed for structural use in liquid helium was investigated. Plates of interstitial-free Fe-12Ni-0.25Ti alloy and carbon-containing 9 Ni steel were welded with 14 Ni ferritic fillers using a gas tungsten arc welding (GTAW) process with pure argon gas shielding. The ferritic weldments made have a strength closely matching those of the base plates without a significant loss in base metal toughness at temperatures as low as 4.2 K. The comparable toughness obtained in the welded region is attributed to three factors; the defect-free weldment, the chemical cleanliness of the GTAW weld deposit, and the in-process formation of an appropriate microstructure in the welded region. Special emphasis in this study was placed on changes in microstructures with respect to the characteristic of the weld thermal cycles and the effect of the resultant microstructures on low temperature toughness. In the heat-affected zone (HAZ) of multipass welded 9Ni steel, the retained (or precipitated) austenite is removed by the weld heat cycles but the sequential rapid heat cycles to successively lower peak temperatures associated with succeeding weld passes re-establish high toughness by sequentially refining the grain size and gettering carbon in the form of cementite precipitates. On the other hand, the high toughness in the HAZ of the 12Ni alloy and in the weld deposit is a direct consequence of repeated grain refinement through the overlapped austenitizing cycles and is not affected by the tempering cycles because of the carbon-free nature of these materials. 46 figures.

23972 Structure of bimetallic clusters. Extended x-ray absorption fine structure (EXAFS) studies of Ir—Rh clusters. Meitzner, G.; Via, G.H.; Lytle, F.W.; Sinfelt, J.H. (Corporate Research Science Laboratories, Exxon Research and Engineering Company, Linden, New Jersey 07036). *Journal of Chemical Physics;* **78**: No. 5, 2533-2541(1 Mar 1983).

The extended x-ray absorption fine structures (EXAFS) associated with the L/sub III/ absorption edge of iridium and the K absorption edge of rhodium were investigated for catalysts containing bimetallic clusters of these elements dispersed on silica or alumina. The catalysts contained 1 wt.% iridium and 0.5 wt.% rhodium, which corresponds to an Ir/Rh atomic ratio close to 1. From the EXAFS data, it is concluded that the rhodium concentration in the surface region of the iridium—rhodium clusters is greater than it is in the interior. The EXAFS data also indicate that the iridium—rhodium clusters are more highly dispersed on alumina than on silica.

23973 Specific heat of in situ superconducting composites. Eucker, S.S.; Verhoeven, J.D.; Finnemore, D.K. (Ames Laboratory-USDOE and Department of Physics, Iowa State University, Ames, Iowa 50011). *Journal of Applied Physics;* **54**: No. 3, 1471-1475(Mar 1983). Contract W-7405-ENG-82.

Specific heat measurements have been used to study the electronic excitation spectrum of the Cu regions of in situ prepared Cu-Nb and Cu—Nb_3Sn composites having filament dimensions comparable to the superconducting coherence distance. At very low temperatures the major contribution to C/sub p/ comes from the electrons in the Cu regions so the excitation spectrum in Cu is easily accessible by this technique. Measurements show that the specific heat is far smaller than that expected if the Cu were normal, indicating that there is a well developed superconducting order parameter of about the size predicted from the de Gennes boundary conditions, i.e., about 0.3 meV. With the application of only a few millitesla, this gap is reduced by at least a factor of 10.

23974 Temperature dependence of critical current superconducting for in situ composites. Finnemore, D.K.; Ostenson, J.E.; Gibson, E.D.; Verhoeven, J.D.; Doyle, T.B. (Ames Laboratory-USDOE and Department of Physics, and Department of Materials Science and Engineering, Iowa State University, Ames, Iowa 50011). *Journal of Applied Physics;* **54**: No. 3, 1476-1478(Mar 1983). Contract W-7405-ENG-82.

The critical current for in situ prepared Cu-Nb_3Sn microfilamentary composites has been measured as a function of both temperature and magnetic field in order to determine the suitability of these materials for superconducting magnets which operate above 4.2 K, either continuously or in brief excursions. A rather simple relation, J/sub c/ = AB/sup -1/2/ (B/sub c/2-B)^2 where A = 860 A cm^{-2}T/sup -3/2/, describes the data very well. The temperature dependence of B/sub c/2 is the dominant factor controlling J/sub c/(T). Values of B/sub c/2 determined both from low current resistive transitions and from Kramer plot extrapolations give B/sub c/2 = $B_0(1-t^2)$, where B_0 is approximately 19 T. Scaling applies in these materials and the volume flux pinning force goes as B/sup 5/2//sub c/2 as predicted if the flux line shear modulus controls the flux pinning. The data show that a magnet designed to operate at 4.2 K and 12 T also will operate well at 10 K and 7 T.

23975 (RFP-Trans—379) Magnetic powder for treatment of oil-polluted waste water and process for manufacturing the powder. Takeuchi, H.; Matsuyama, Y. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Mar 1983. Contract AC04-76DP03533. Translation of Japanese Kokai Patent Publication No. Sho 53-17592, 1978. 7p. NTIS, PC A02/MF A01. Order Number DE83008676.

A process is claimed for manufacturing a magnetic substance which can be added in very small quantities to oil-polluted water in order to remove the oil by means of a magnetic separator. The magnetic powder is coated with a fat-soluble substance in the following manner: dried magnetic material is first mixed with the fat-soluble substance and the mixture is cooled and crushed; or the dried magnetic powder is mixed with a fat-soluble substance which has been dissolved in a solvent, after which the solvent is removed. The magnetic powder to be used in this invention can be iron powder, magnetite, ferrite or a mixture of such powders. The fat-soluble substance can be: fats and oils such as castor oil, soybean oil cottonseed oil; higher fatty acids such as synthetic stearic acid, palmetic acid; hydrocarbons such as naphthene, wax; higher aliphatic alcohols such as stearyl alcohol; natural resins such as pine resin; and synthetic resins such as polyethylene, polypropylene. (ATT)

23976 Method for producing highly reflective metal surfaces. Arnold, J.B.; Steger, P.J.; Wright, R.R. (to Dept. of Energy). US Patent 4,374,002. 15 Feb 1983. Filed date 4 Mar 1982. vp.

PAT-APPL-354571.

The invention is a novel method for producing mirror surfaces which are extremely smooth and which have high optical reflectivity. The method includes electrolessly depositing an amorphous layer of nickel on an article and then diamondmachining the resulting nickel surface to increase its smoothness and reflectivity. The machined nickel surface then is passivated with respect to the formation of bonds with electrodeposited nickel. Nickel then is electrodeposited on the passivated surface to form a layer of electroplated nickel whose inside surface is a replica of the passivated surface. The electroplated nickel layer then is separated from the passivated surface. The mandrel then may be re-passivated and provided with a layer of electrodeposited nickel, which is then recovered from the mandrel providing a second replica. The mandrel can be so re-used to provide many such replicas. As compared with producing each mirror-finished article by plating and diamond-machining, the new method is faster and less expensive.

23977 Small-polaron models for the hydrogen-concentration dependence of hydrogen diffusion in Nb. Tonks, D.L.; Silver, R.N. (Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 6455-6469(15 Dec 1982).

We have generalized simplified small-polaron models for the tunneling of interstitials in solids to include interactions between the diffusing particles. This is applied to the calculation of the average hopping rate of hydrogen in niobium as a function of hydrogen concentration for small concentrations, i.e., for an H-Nb ratio (c) of roughly 0.06 or less. The hopping of a single H under the influence of nearby, stationary H's was treated. The interactions between interstitials include a hard-core repulsion and a lattice-mediated strain interaction. Both a constant tunneling transfer integral and one that depended on the displacements of nearby Nb atoms were included. Only tunneling via the ground vibrational level of the interstitials was treated. For c< or =0.06, the calculated increase in the hopping activation energy as a function of c was linear in c and comparable in magnitude with the experimental increase. Our simplified-model results show that the strain interaction between H's in Nb is important for their diffusion and that this interaction needs to be included in whatever more elaborate diffusion models are developed.

23978 Temperature dependence of electrical resistivity of vanadium, platinum and copper. Poker, D.B.; Klabunde, C.E. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 7012-7014(15 Dec 1982).

The electrical resistivities of V, Pt, and Cu (resistance ratios of 387, 7192, and 2047, respectively) were measured in the temperature range 6—327 K, and were analyzed following the theories of Bloch-Grueneisen and Wilson. An excellent fit to the data was obtained over the entire temperature range. The low-temperature (6—12 K) data were analyzed for the existence of a quadratic temperature dependence; the V and Pt exhibited quadratic temperature dependences with coefficients of 370 and 110 fΩ m K^{-2}, respectively. The data did not support the use of a quadratic term over the entire temperature range.

23979 Theory of photoemission from metallic Ce. Liu, S.H.; Ho, K. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 7052-7055(15 Dec 1982).

It is shown that the two-peak structure of the 4f electron photoemission spectrum of Ce metal and its compounds may arise from two kinds of final states, those with and those without screening by a Ce 5d electron in an impurity state. A comparison between theory and experiment reveals that the γ-α phase transition is accompanied by a very slight increase in conduction-electron population.

23980 Photoemission studies of the γ-α phase transition in Ce: Changes in 4f character. Wieliczka, D.; Weaver, J.H.; Lynch, D.W.; Olson, C.G. (Ames Laboratory and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 7056-7059(15 Dec 1982).

photoemmission studies of the γ-α phase transition in cerium show changes in two 4f-related features in the valence band (0.3 and 2 eV below E/sub F/) and broadening of the multiplet structure in the region of the 4d-4f transitions. We show that the observed features can be explained by increased hybridization of the 4f wave function upon entering the α phase.

23981 Normal photoelectron diffraction of O/Cu(001): A surface-structural determination. Tobin, J.G.; Klebanoff, L.E.; Rosenblatt, D.H.; Davis, R.F.; Umbach, E.; Baca, A.G.; Shirley, D.A.; Huang, Y.; Kang, W.M.; Tong, S.Y. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory, and Department of Chemistry, University of California, Berkeley, California 94720). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 7076-7078(15 Dec 1982).

The two systems c(2 x 2)O/Cu(001) and (√2 x 2 √2) R45° O/Cu(001) have been studied by normal photoelectron diffraction (NPD), with the use of O(1s) line. In the c(2 x 2) structure oxygen occupies the fourfold hollow site, with d/sub perpendicular/ = 0.80(5) A. The √2 x 2 √2 structure has a similar NPD curve, indicating the same local site geometry for the c(2 x 2) sublattice.

23982 Thermodynamic assessment of in-reactor iodine SCC of zircaloy. Olander, D.R. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.; California Univ., Berkeley (USA). Dept. of Nuclear Engineering). *Journal of Nuclear Materials;* **110**: No. 2/3, 343-345(Oct 1982).

Published in summary form only; Letter-to-the-editor.

23983 Martensitic transformation in uranium metal and its effect on superconductivity. Sandenaw, T.A. (Los Alamos Natl Lab, NM, USA). *Scripta Metallurgica;* **16**: No. 8, 1005-1008(Aug 1982).

The author proposes that the superconducting transition temperature (T/sub c/) is affected by the degree of completion of the /alpha/-U/yields/alpha/sup prime/-U martensitic transformation and the superconducting behavior must therefore respond to factors important with high-T/sub c/ materials. It is suggested that the effects of impurities on phase stability and a variable low-temperature martensitic transformation can be explained by a combination of three theories: VELD theory McMillan's Landau theory and Roitburd's domain theory. It is proposed that there may be more than one incommensurate charge-density wave state in the pre-martensitic temperature range. 23 refs.

23984 Stem observation of crystallization in thin films of amorphous Fe/sub 40/Ni/sub 40/P/sub 14/B/sub 6/. Hall, I.W.; Kramer, J.J. (Univ of Delaware, Newark, USA). *Scripta Metallurgica;* **16**: No. 8, 917-921(Aug 1982).

The results reported show that crystallization in thin films of Metglas 2826 can occur even at room temperature. Microanalysis and microdiffraction data have established the structure and composition of the phases. 7 refs.

23985 Measure of the electron drag and the phonon drag in zinc crystals. Pellegrino, J.; Zhou, B.L.; Galligan, J.M. (Univ of Conn, Storrs, USA). *Scripta Metallurgica;* **16**: No. 8, 985-986(Aug 1982).

A magnetic field can alter the electron drag on a mobile dislocation but it does not affect the phonon drag term. An experiment on zinc crystals shows that a distinction can be made between an electron drag process and a phonon drag process. This technique illustrates that the temperature dependence of the electron drag and phonon drag can be separately established. 8 refs.

23986 Crack growth retardation due to micro-roughness - a mechanism for overload effects in fatigue. Suresh, S. (Lawrence Berkeley Lab, CA, USA). *Scripta Metallurgica;* **16**: No. 8, 995-999(Aug 1982).

Based on the fracture surface features of 2024-T3 aluminum alloy. This note presents new mechanisms for crack growth retardation based on a micro-roughness model. This mode, which does not exclude the role of other factors such as residual stresses or blunting, provides a rational for the occurrence of several unexplained overload effects on crack growth retardation reported in the literature. In addition, further sources of crack growth attenuation arising from fracture surface oxidation are discussed. 22 refs.

23987 Surface enhanced Raman scattering in corrosion science: benzotriazole on copper. Kester, J.J.; Furtak, T.E.; Bevolo, A.J. (US DOE, Ames, Iowa, USA). *Journal of the Electrochemical Society;* **129**: No. 8, 1716-1719(Aug 1982).

New aspects of molecular interactions in corrosion inhibition are reported in this first investigation of benzotriazole on copper using surface enhanced Raman scattering (SERS). The observation of hysteresis in the Raman intensity of concentrated solutions as a function of applied voltage is attributed to a conformation or bonding rearrangement in the protective layer. Also, a photoalteration of the benzotriazole complex, which occurs during anodization, produces improved corrosion resistance and increases the Raman activity. The ability of SERS to detect these photoaltered layers provides a new probe for corrosion studies. 18 refs.

23988 Thermal stability data of amorphous binary alloys. Wang, R. (Pacific Northwest Lab., Richland, WA). *Bulletin of Alloy Phase Diagrams;* **2**: No. 3, 269-280(1981).

Data on the thermal stability of amorphous (glassy) binary alloys are compiled. Where available, alloy preparation method, crystallization temperature and method of measurement of crystallization temperature are tabulated. Other relevant aspects such as crystallized phases and compositions, glass transition temperature and analytical parameter variations also are given when data are available.

23989 (ORNL-tr—4929) Evaluation of the effect of anions on the corrosion of aluminum in water. Kubicki, J.; Falewicz, P. Translated from *Prace Naukowe Instytutu Technologii Nieorganicznej i Nawozow Mineralnych Politechniki Wroclawskiej ;* No. 16, 247-257(1979). Contract W-7405-ENG-26. 13p. NTIS, PC A02/MF A01. Order Number DE83003853.

Portions are illegible in microfiche products.

The results of research and the effect of the ionic composition of water and the resistance of aluminum to corrosion are presented. It was found that the concentration of HCO_3 ions and the temperature mainly determine the aggressiveness of water with respect to aluminum. 8 tables.

23990 (ORNL-tr—4959) Studies of the diffusion of hydrogen in yttrium. Frisius, F.; Hackbarth, H.; Wille, P. Translated from *Atomkernenergie ;* **27**: No. 4, 287-288(1976). Contract W-7405-ENG-26. 7p. NTIS, PC A02/MF A01. Order Number DE83007180.

Portions are illegible in microfiche products.

From measurements the following values are obtained for the diffusion coefficient D of hydrogen in yttrium sheet (99% purity, DEGUSSA): D (400°C) = (1.05 +- 3%) . 10^{-6} cm^2/s; D (500°C) = (3.69 +- 5%) . 10^{-6} cm^2/s; D_0 = (0.103 +- 0.05) cm^2/s; Q = (15370 +- 4%) cal/mol. The diffusion coefficient measured for 400°C agrees within the limits of error with the coefficient measured by us previously.

3602 Ceramics, Cermets, And Refractories

REFER ALSO TO CITATION(S) 22938, 22939, 23181, 23181, 23214, 23215, 23216, 23969, 24017, 25162, 25162

23991 (AD-A—120939/4) Densification of monoclinic ZrO_2 with vanadate additives. Final report 1 Mar 79-1 Mar 82. Buchanan, R.C.; DeFord, H.D. (Illinois Univ., Urbana (USA). Dept. of Ceramic Engineering). 15 Jul 1982. 49p. NTIS, PC A03/MF A01.

Sintering of monoclinic ZrO_2 ceramic powders was carried out < 1150 C using 1-8 wt% V_2O_5 (or ZrV_2O_8 equivalent) as flux additive. Densities > 92% ThD were achieved using a relatively coarse commercial (PS approx = 1.5 micrometers) ZrO2 powder with 1.5-2.0 wt% V_3O_{8s} additive by sintering in air at 1100 C for up to 24 hr. High pressed densities were found to be correlated to high fired densities, thus, ZrO_2 powders with average particle size < micrometers gave lower densities. Microstructural and chemical analysis of the sintered samples were carried out to determine the composition and a relative distribution of the ZrO_2 and intergranular phases. Methods used included: SEM, TEM, X-sray microanalysis (EDAX), EPR, DTA, TGA, and arc emission spectroscopy techniques. Results showed the solubility of vanadium in the ZrO_2 phase to be low (approx 0.2 at .%-indicated to be V4+ ions). The bulk of the added vanadium was found in the grain boundary region which together with Ca, Si, and Mg impurities formed the amorphous bonding phase. This indicates densification by reactive liquid phase sintering aided perhaps by defect migration. The optimum combination of density, strength, electrical conductivity, and expansion coefficient was found for a V_2O_5 content of 1/5 wt%.

23992 (ANL/FPP/TM—166) Effects of irradiation on ceramics for fusion-reactor applications. Porter, D.L. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 61p. NTIS, PC A04/MF A01. Order Number DE83009468.

The purpose of this study, coordinated with efforts of LANL and Grumman Aircraft, was to lay some basic groundwork to study the irradiation effects on the engineering properties of some useful classes of ceramic materials; ANL's efforts were pointed towards multiphase materials (glass ceramics and partially-stabilized zirconias). The materials were irradiated at 400 and 550°C to fast (E > 0.1 MeV) neutron fluences of ~ 2 x 10^{22} n/cm^2. Fluorophlogapite mica based glass ceramics (Macor, etc.) were found susceptible to weakening due to void formtion between mica plates. Composition variations within this class of glass ceramics seemed to cause sharp variations in the magnitude of the effect. Lithium silicate glass ceramic (ReX) showed sharp contrasts between the effects of ionization irradiation and displacement damage, neutron irradiation having little effect on the ReX structure while electron irradiation creating lithium silicate vitrification and rapid structural annealing.

23993 (ANL/NESC—970) DAP; deuterium depth profile in uniform solids. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Baldo, P. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048970.

Maxima of - 1024 channels for the experimental spectrum 50 depth divisions 10 radial divisions.

The Deuterium Analysis Program, DAP, is a tool for the analysis of data from nuclear reaction measurements which utilize the D(He-3,alpha)H reaction to determine deuterium concentration profiles in the near-surface region of solids.IBM303x; FORTRAN IV; OS/MVS; 320K bytes of memory and auxiliary plotting devices are required..

23994 (BMFT-FB-T—80-128) High temperature properties of Si_3N_4. Grathwohl, G.; Porz, F.; Thuemmler, F. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1980. 36p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750372.

The creep behaviour is one of the mechanical high temperature properties which are of considerable interest for the use of

RBSN in gas turbines. Based on literature data the creep behaviour of RBSN is given. Especially the correlation between microstructure and creep behaviour has been investigated. The internal oxidation during the creep test in air plays an important role. Materials have been developed which show creep rates of below 10^{-6}h at 1300°C and 70 to 100 MN/². They also show only a very limited amount of internal oxidation because of a narrow pore size distrubution. Activation energies between 540 and 700 kJ mol^{-1} and stress exponents of $1.2 < n < 2.3$ have been determined.

23995 **(CONF-810347—6) Diffusion mechanisms in transition-metal oxides.** Peterson, N.L.; Chen, W.K. (Argonne National Lab., IL (USA)). Jan 1981. Contract W-31-109-ENG-38. 34p. NTIS, PC A03/MF A01. Order Number DE83007592.

From NACE international conference on high temperature corrosion; San Diego, CA, USA (2 Mar 1981).

Portions are illegible in microfiche products.

After a brief introduction to correlation effects in diffusion and how they may be determined from isotope-effect experiments, results of such experiments are presented for cation self-diffusion in Co/sub 1-δ/O, Mn /sub 1-δ/O, and Fe_3O_4 as a function of the deviation from stoichiometry. The results are used to deduce the mechanisms of diffusion, to provide information on the defect chemistry, and to deduce the importance of defect clustering and defect-defect interactions in these off-stoichiometric oxides. 8 figures.

23996 **(CONF-810809—32) Study of coexistence of ferromagnetism and superconductivity in single-crystal $ErRh_4B_4$.** Sinha, S.K.; Crabtree, G.W.; Hinks, D.G.; Mook, H. (Argonne National Lab., IL (USA); Oak Ridge National Lab., TN (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83008507.

From 16. international conference on low temperature physics; Los Angeles, CA, USA (19 Aug 1981).

Neutron diffraction and resistivity measurements on single crystals of $ErRh_4B_4$ have revealed that both superconductivity and ferromagnetic order coexist in this material between 0.71 and 1.2°K. In this intermediate phase, a linear polarized modulated structure with a wavelength of approximately 100 A is observed. The modulated moment increases faster than the ferromagnetic moment down to 0.71 K and then disappears suddenly, with loss of superconductivity and a transition to a normal ferromagnetic state. This transition is accompanied by temperature hysteresis of about 60 mK. The same hysteresis, in the inverse sense, is exhibited by the ferromagnetic component. We interpret the intermediate phase as being one of coexisting normal ferromagnetic domains and superconducting sinusoidally ordered domains. Evidence of a small percentage of small ferromagnetic regions of size ~ 100 A is also seen in both the intermediate and ferromagnetic phases. 3 figures.

23997 **(CONF-820548—6) Interstitial site occupation in ZrNiH.** Westlake, D.G.; Shaked, H.; Mason, P.R.; McCart, B.R.; Mueller, M.H.; Matsumoto, T.; Amano, M. (Argonne National Lab., IL (USA); National Research Inst. for Metals, Tokyo (Japan)). Dec 1981. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83007669.

From International symposium on the properties and applications of metal hydrides; Toba, Japan (30 May 1982).

Portions are illegible in microfiche products.

In-situ x-ray diffraction measurements during step-wise hydrogenation of the intermetallic compound ZrNi have confirmed the existence of a stable compound ZrNiH. Neutron diffraction measurements on ZrNiD have allowed a determination of the site occupied by D. This site is tetrahedrally coordinated by four Zr atoms as predicted earlier from a model based solely on geometric considerations. Occupation of this site causes the lattice to distort from an orthorhombic to a triclinic structure. The trihydride is formed when two completely different types of sites are filled, to the exclusion of the sites occupied originally, causing reversion of the lattice to an orthorhombic structure. Other confirmed predictions of the geometric model are discussed. 3 figures.

23998 **(CONF-820605—27) Hydrides of oxygen-stabilized intermetallic phases.** Mendelsohn, M.H. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007626.

From World hydrogen energy conference; Pasadena, CA, USA (13 Jun 1982).

Recent work on the hydrogen adsorption properties of Ti_2Ni-type intermetallic phases containing oxygen is summarized. Preliminary work on the first Ti_2Ni-type phase of composition A_3B_3O is presented. The hydrogen adsorption properties of the Zr-containing intermetallic compound Zr_3V_3O is compared to the hydrogen absorption properties of previously investigated Ti-containing compounds of composition Ti4M2O/sub x/ (M = Fe, Co, Ni; x = 0-1). The compound Zr_3V_3O has been found rapidly to absorb and desorb about 3 moles of hydrogen gas per mole of alloy. Enthalpies and entropies of solution are presented for nine different compositions of the hydride Zr3V3OH/sub y/. Further studies of the hydrogen absorption properties of Zr3V3O/sub x/ are in progress.

23999 **(CONF-820659—6) ^{11}B study of spin dynamics in Y/sub 1-x/RE/sub x/Rh_4B_4.** Kumagai, K.; Fradin, F.Y. (Argonne National Lab., IL (USA)). Jun 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007589.

From 4. conference on superconductivity in d- and f-band metals; Karlsruhe, F.R. Germany (28 Jun 1982).

There has been intense interest in re-entrance and coexistence in ternary rare earth magnetic superconductors of the form RE Rh_4B_4. Of particular interest in this investigation is the effect of the superconducting state on the RKKY (Yosida, 1957) coupling between RE ions. Since one expects the conduction electron spin susceptibility chi/sup e/(q) to be cut off for $q < 1/\xi$ in the superconducting state, a depression f the RKKY coupling should follow. Such an effect would both depress the magnetic ordering temperature and result in slower relaxation rates tau/sub $m/^{-1}$ for the RE moments in the superconducting state. This paper reports on the spin dynamics of the RE ions using the ^{11}B nuclear magnetic relaxation rate T_1^{-1} in dilute Y/sub 1-x/RE/sub x/Rh_4B_4 (RE = Gd and Er).

24000 **(CONF-820864—4) Formation energy of point defects in free surfaces and grain boundaries in MgO.** Wolf, D. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83008524.

From 4. europhysical topical conference on lattice defects in ionic crystals; Dublin, Ireland (30 Aug 1982).

The computer code developed in recent years at Argonne National Laboratory for the investigation of the energy and structure of interfaces in ionic crystals has been extended to permit the consideration of neutral intrinsic point defects in such interfaces. As examples, bound Schottky pairs as well as substitutional Fe^{2+} and Ca^{2+} impurities are considered in the (100) surface and surface region. The role of isovalent impurities in the free (110) surface region and in a coincident-site twist boundary are also investigated. Results are compared and found in agreement with results obtained by means of the HADES program.

24001 **(CONF-820909—19) Vapor pressures and vapor compositions in equilibrium with hypostoichiometric plutonium dioxide at high temperatures.** Green, D.W.; Fink, J.K.; Leibowitz, L. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 29p. NTIS, PC A03/MF A01. Order Number DE83007787.

From National meeting of the American Chemical Society; Kansas City, MO, USA (1 Sep 1982).

Portions are illegible in microfiche products.

Vapor pressures and vapor compositions have been calculated for $1500 \leqq T \leqq 4000$°K. Thermodynamic functions for the condensed phase and for each of the gaseous species were combined with an oxygen-potential model extended into the liquid region to obtain the partial pressures of O_2, O, Pu, PuO and PuO_2. The calculated oxygen pressures increase very rapidly as stoichiometry is approached. At least part of this increase is a consequence of the exclusion of Pu^{4+} from the oxygen-potential model. No reli-

able method was found to estimate the importance of this ion. As a result of large oxygen potentials at high temperatures, extremely high total pressures that produced unreasonably high vapor densities were calculated. The highest temperature was therefore limited to 400 K, and the range of oxygen-to-metal ratios was limited to 1.994 to 1.70. These calculations show that vapor in equilibrium with hypostoichiometric plutonium dioxide is poorly approximated as PuO_2 for most of the temperture and composition range of interest. The vapor is much more oxygen-rich than the condensed phase. Implications for the (U,Pu)O/sub 2-x/ system are discussed. (DLC)

24002 **(CONF-820929—13) Observation of a first-order phase transition in single-crystal $ErRh_4B_4$ at H/sub c2/.** Behroozi, F.; Crabtree, G.W.; Campbell, S.A.; Hinks, D.G. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 14p. NTIS, PC A02/MF A01. Order Number DE83008609.

From IUPAP international conference on magnetism; Kyoto, Japan (6 Sep 1982).

Detailed magnetization curves show a first-order phase transition in single-crystal $ErRh_4B_4$ at H/sub c2/ for the temperature range 3.3 K $\geq$ T $\geq$ 1.4 K when the field is along the anti a axis. Below 3.3 K, the discontinuity in magnetization at H/sub c2 grows with decreasing temperature and moves to lower fields, eventually developing into the spontaneous moment in the ferromagnetic state. In the anti c direction the superconducting magnetization curves exhibit ordinary type-II behavior. 4 figures.

24003 **(DOE/ER/10915—2) High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982.** Blachere, J.R.; Pettit, F.S. (Pittsburgh Univ., PA (USA). Dept. of Metallurgical and Materials Engineering). Feb 1983. Contract AC02-81ER10915. 44p. (SETEC-MME—83-004). NTIS, PC A03/MF A01. Order Number DE83008763.

In this program, the corrosion of ceramics is studied from a mechanistic point of view. In an integrated fundamental approach the gaseous corrosion investigation is followed by that of deposit-modified gaseous corrosion and eventually by deep melt corrosion. The study of the gaseous corrosion of Al H CO_3 and SO_2-SO_3 is almost completed. Particular emphasis has been placed on the interaction between SO_3 and Al_2O_3 at the lower temperatures. A few additional experiments remain to characterize better the products and check some interpretations but the following conclusions have been obtained: (1) SiO_2 and Al_2O_3 are very resistant to gaseous corrosion, (2) pure oxides had no measureable weight changes during exposure to all gases at 700°C and 1000°C, and (3) at 1400°C, silica devitrified and was reduced in wet hydrogen. The reaction of the aluminas at this temperature is related to their impurities and no reaction occurred with higher purity alumina single crystal. The reaction of Al_2O_3 with SO_3 follows qualitatively the general trends predicted by thermodynamics: (1) decrease in sulfate formation with decreasing SO_3 pressure, (2) decrease in sulfate formation with increasing temperature, and (3) however the sulfate product formed at slightly lower SO_3 pressures than expected from thermodynamics. The corrosion products on the higher purity polycrystalline Al_2O_3 are not uniform. Some regions of th samples formed little or no product. This appears associated with different grains in polished specimen and different faces of grains in the as-received alumina suggesting impurity and orientation effects. The distribution and morphology of the products will be studied in more detail.

24004 (Juel-Conf—42(Vol.2), pp 733-766) **Critical review of radiation effects on borosilicate glasses.** Lanza, F.; Manara, A.; Rutten, F. van; Antonini, M. Jun 1981. NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

Most of the experimental values have been obtained by loading the glass with alpha emitters like Cm 244 and Pu 238. The data existing in literature on stored energy, and density variation are presented and discussed. Attention is given to the variation of the leaching rate due to the radiation effect. Samples loaded with alpha emitters have given data up to 0.17 dpa and such bombarded with heavy ions show large effects due to dose rate effects. A study on defect formation has shown that under electrons irradiation, formation of bubbles is possible.

24005 **(LA—9650-MS) Production and characterization of beta-silicon carbide and alpha-silicon nitride whiskers for ceramic matrix composites.** Milewski, J.V.; Gac, F.D.; Petrovic, J.J. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 8p. NTIS, PC A02/MF A01. Order Number DE83008282.

Los Alamos has undertaken an extensive program to develop improved structural ceramics. One avenue of research involves the investigation of short-fiber reinforcement (whisker) technology for production of ceramic matrix composites. Initial efforts have focused on the synthesis of high-quality beta-silicon carbide and alpha-silicon nitride whiskers. Details of the whisker growth processes and the properties of the whiskers are discussed.

24006 **(N—82-21715) Optical properties of solids for solar energy conversion.** Karlsson, B. (Uppsala Univ. (Sweden)). 1981. 19p. NTIS, PC A02/MF A01.

Thesis.

The optical properties of transition metal carbides and nitrides were studied by reflectance measurements between 0.2 and 15 micrometers at room temperature and up to 500 C. An interpretation of the pronounced difference between the nitrides and carbides is made from a model in the electronic density of states distribution. The model is used to explain shifts in the optical constants when carbon or nitrogen-vacancies are introduced in the nitride. Calculations based on the optical constants suggest the nitrides as a new material for transparent heat-mirrors. The refractive index and band-edge of CuO, Cu sub 2O, Fe sub 2O sub 3, Cr sub 2O sub 3, i-C and a-Si have been measured and discussed within the framework of a new model for evaluating their potential use as the absorbing layer on a tandem-selective surface. A number of oxides on copper and steel were prepared by thermal and chemical methods and investigated for use as selectively absorbing surfaces. Thin films of noble and transition metals have been prepared and optically investigated for use as semi-transparent coatings on domestic windows.

24007 **(SAND—82-2469) Spectral and spatial studies of shock-induced luminescence from quartz.** Brannon, P.J.; Konrad, C.H.; Morris, R.W.; Jones, E.D.; Asay, J.R. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 84p. NTIS, PC A05/MF A01. Order Number DE83008424.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Spatial and spectral studies of shock-induced luminescence from both fused and crystalline quartz as a function of stress level revealed the following information: crystalline x-cut quartz has a threshold for emission near the dynamic yield point (about 6 GPa). Fused quartz has a threshold near 16 GPa which is not the dynamic yield point (~ 10 GPa). The spatial distribution of the luminescence from x-cut quartz changes from emission along discrete lines to emission uniformly over the sample as the stress level increases from 6 to 8 GPa. The spatial distribution for fused quartz is uniform with large-scale areas where no emission is observed. The spectra of emission from both fused and x-cut quartz are band-like rather than blackbody. Crystalline x-cut quartz has emission peaks near 400 and 600 nm and fused quartz has a dominant 600-nm peak with a minor peak near 400 nm. A change in the 400-nm emission with time can be correlated to wave interaction times. A discussion of the luminous emission in terms of yielding and oter physical mechanisms is given. Results of this study are discussed in terms of using shock-induced luminescence as a means of detecting stress levels in materials.

24008 **(UCID—19663) First quarterly report of the DARPA dynamic synthesis and consolidation program.** Cline, C.F. (ed.). (Lawrence Livermore National Lab., CA (USA)). Aug 1982. Contract W-7405-ENG-48. 382p. NTIS, PC A17/MF A01. Order Number DE83008408.

Portions are illegible in microfiche products.

The report covers activities of national laboratories, universities, and research institutes. The program activities include dynamic

compaction, shock activation, and combustion and plasma synthesis. The primary materials under study are AlN, Al_2O_3, TiC, and TiB_2. (DLC)

24009 **High field conduction and dielectric breakdown in nominally pure and nickel-doped MgO crystals at high temperatures.** Tsang, K.L.; Chen, Y.; O'Dwyer, J.J. (Department of Physics, University of Alabama, Birmingham, Alabama 35294). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 6909-6917(15 Dec 1982). Contract W-7405-ENG-26.

The phenomenon of dielectric (or more aptly, electrothermal) breakdown of nominally pure and nickle-doped MgO crystals at 1473 K is studied with the use of a field of 1500 V cm^{-1}. The current transients induced by constant and alternating fields as well as by field reversals, and open- and short-circuit conditions are investigated. Activation energies, obtained from the temperature dependence of current parameters, are also obtained. It is concluded that the mechanism leading to the breakdown involves the buildup of space charge caused by the injection of carriers from the electrodes and drift of ions.

24010 **NMR study of phase transitions in VT/sub 0.50/ and VT/sub 0.75/.** Bowman, R.C. Jr.; Attalla, A.; Tadlock, W.E.; Sullenger, D.B.; Yauger, R.L. (Monsanto Res Corp, Miamisburg, Ohio, USA). *Scripta Metallurgica;* **16**: No. 8, 933-938(Aug 1982).

The work describes the preparation of polycrystalline VT/sub 0.50/ and VT/sub 0.75/ and observations of phase transitions using pulse nuclear magnetic resonance measurements of triton relaxation times. The critical temperatures (T/sub c/) for the phase transitions in the VT/sub x/ samples follow the mass-dependent trends found for VH/sub x/ and VD/sub x/ and qualitatively obey the isotopic dependence predicted by the theoretical models of Entin et al. 23 refs.

24011 **Hydrogen-implanted silicon nitride.** Stein, H.J. (Sandia Natl Lab, Albuquerque, NM, USA). *Journal of the Electrochemical Society;* **129**: No. 8, 1786-1791(Aug 1982).

Chemical bonding changes and electrical effects of hydrogen implantation into silicon nitride have been investigated. Silicon nitride films were prepared by chemical vapor deposition from the decomposition products of NH/sub 3/ and SiH/sub 4/ gases onto silicon substrates at 850/degree/C. Implantation of either hydrogen or deuterium causes Si-H bond formation by transfering deposition-incorporated hydrogen from nitrogen to silicon bonds. The implanted hydrogen isotope, however, bonds predominantly on nitrogen. Displacement damage, which causes the N-H band to broaden and shift to lower frequencies, is reduced by annealing at 500/degree/C, and a loss of both N-H and Si-H bonds occurs when implanted films are annealed at temperatures >500/degree/C. The observed electrical effects of hydrogen implantation of silicon nitride followed by annealing at 500/degree/C are increased equilibrium positive charge, decreased charge transport, and enhanced charge trapping and retention. 23 refs.

24012 **Theoretical estimate of solution-precipitation creep in MgO-fluxed Si/sub 3/N/sub 4/.** Tsai, R.L.; Raj, R. (Cornell Univ, Ithaca, NY, USA). *Journal of the American Ceramic Society;* **65**: No. 6, 88-90(Jun 1982).

The creep rate in MgO-fluxed hot-pressed Si/sub 3/N/sub 4/ is calculated by means of a model which assumes a solution-precipitation mechanism, and by using the kinetic data for the dissolution rate of /beta/-Si/sub 3/N/sub 4/ in an Mg-Si-O-N glass (which was obtained in independent experiments). Despite simplifying assumptions, the predictions match quite favorably with experimental measurements of creep in hot-pressed Si/sub 3/N/sub 4/. 10 refs.

24013 **Yttrium, an isoelectric donor in /alpha/-Al/sub 2/O/sub 3/.** El-Aiat, M.M.; Kroeger, F.A. (Univ of South Calif, Los Angeles, USA). *Journal of the American Ceramic Society;* **65**: No. 6, 280-283(Jun 1982).

Measurements of dc electrical conductivity and emf of single-crystal and polycrystalline /alpha/-Al/sub 2/O/sub 3/ doped, respectively, with 100 and 300 ppm yttrium show that yttrium, although isoelectronic with aluminum, is a donor. The donor activity of Y supports the view that the favorable effect of Y on the oxidation of super alloys is due to reduced diffusion of Al. 33 refs.

24014 **Oxidation stability of advanced reaction-bonded Si/sub 3/N/sub 4/ materials.** Lindberg, L.J.; Richerson, D.W.; Carruthers, W.D.; Gersch, H.M. (Garrett Turbine Engine Co, Phoenix, AZ, USA). *American Ceramic Society Bulletin;* **61**: No. 5, 574-578(May 1982).

The present paper summarizes oxidation studies conducted intermittently during the past four years on improved RBSN materials. Preoxidation treatments are also described that quickly seal the surface by forming a coherent oxide layer and that protect against internal oxidation. 11 refs.

24015 **Magnetic correlations in $ErRh_4B_4$.** Radousky, H.B.; Knapp, G.S.; Kouvel, J.S.; Klippert, T.E.; Downey, J.W. (Argonne National Lab., IL). pp 151-154 of Ternary superconductors. Shenoy; Dunlap; Fradin (eds.). New York, NY; Elsevier North Holland, Inc. (1981).

The magnetic heat capacity of Y/sub 1-x/Er/sub x/Rh_4B_4 has been measured from 1.5 to 18°K for various Er concentrations. It is shown that the measurements on the dilute alloys allow a separation of crystal field effects from other magnetic phenomena. $ErRh_4B_4$ is a re-entrant superconductor, with T/sub c/ = 8.7°K and Tm = 0.98°K. Above the re-entrant transition, strong fluctuations occur, and are seen to persist almost up to S.C. transition. By integrating that part of the magnetic heat capacity not due to crystal field effects, we find that at 1°K the magnetic entropy due to correlations is only 44% of its full value, Rlog2. This can be compared to $HoRh_4B_4$ where S.C. does not occur and $\approx$ 100% of the correlation entropy is found at Tm. A quantitative comparison is made with the theory of Blount and Varma, which describes these fluctuation effects, and a good agreement is found.

3603 Composite Materials

REFER ALSO TO CITATION(S) 23969, 24746, 24924

24016 (CONF-810913—Vol.1, pp 369-382) **Effect of microcracking on the conduction of heat in brittle composites.** Bentsen, L.D. (Virginia Polytechnic Inst., and State Univ., Blacksburg, VA); Hasselman, D.P.H.; Claussen, N. 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The variables which affect the formation of micro-cracks due to thermal expansion mismatch in brittle composites and their effect on heat conduction properties are discussed. Experimental data for metal oxide-silicon carbide composites are presented which show that microcrack formation can lower the thermal diffusivity and conductivity significantly. Sub-critical growth and healing of the microcracks during thermal cycling are also shown to have an effect on heat transport. Evidence is presented that microcrack formation in brittle composites requires the presence of a residual pore phase. 8 figures.

24017 (CONF-810913—Vol.1, pp 465-471) **High temperature automated creep testing of ceramic fiber board.** Schenck, S.R. (Babcock and Wilcox Co., Lynchburg, VA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

The use of fibrous insulation in high temperature furnaces is growing rapidly as new fiber products are developed and used in new applications. As fiber products are not generally thought of as structural components, it is particularly important to evaluate the behavior of those fiber products that would see stress at elevated

temperatures. To provide some of this information, compression testing and short term creep tests were performed on a standard ceramic fiber board product. A high temperature furnace (3000°F) and special compression test fixtures were designed for a mechanical testing machine. Computer programs were written for the testing machine to control each test and to analyze and store the test data. Test conditions ranged from room temperature to 2000°F at stresses from 10 to 75 psi. The amount of creep was strongly dependent on both stress and temperature. Some creep was even detected at room temperature. Results of the tests provided guidance for product improvement and established performance limits for product applications. 4 figures, 1 table.

24018 (CONF-810913—Vol.1, pp 473-479) **Weathering of sheet molding compounds.** McElroy, P.M.; Medved, D.L.; Roylance, D.K. (Massachusetts Inst. of Tech., Cambridge, MA). 1981. Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061. Order Number DE82906098.

From International conference on environmental degradation of engineering materials; Blacksburg, VA, USA (21 Sep 1981).

Sheet molding compounds (SMC's) are a highly filled, thickenable, short glass fiber reinforced polyester matrix composite. These systems offer property and cost advantages in a wide variety of structural applications, including support structures for solar energy collection systems. In this application, the long-term outdoor weatherability of the material is of great concern. This paper will discuss the mechanisms of ultraviolet radiation-induced degradation as monitored by a variety of spectroscopic and chromatographic techniques. The observed rates of chemical range will be rationalized by an appropriate kinetic scheme, and the results correlated with mechanical property evaluations which include both quasistatic and fatigue loading as well as dynamic mechanical spectroscopy. Results will be presented for a graded series of SMC materials of differing weatherability, subjected to both outdoor and laboratory exposure conditions. 3 figures, 1 table.

24019 (MLM—3039) **Diallyl phthalate prepolymer characterization and testing in fiberglass filled molding compounds.** Whitaker, R.B.; Schneider, R.E.; Schumacher, R.J. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 21 Feb 1983. Contract AC04-76DP00053. 21p. NTIS, PC A02/MF A01. Order Number DE83009352.

A program was undertaken to identify an acceptable alternative to Dapon 35, an o-diallyl phthalate (DAP) prepolymer no longer available. Three o-DAP prepolymers from the Osaka Soda Company and four laboratory-scale prepolymers from Bendix-Kansas city were characterized and evaluated in DAP-fiberglass molding compounds. Gel permeation chromatography results for the Osaka prepolymers showed all three to be very close to one another in molecular weights (mw) and mw distributions, but slightly lower in both than Dapon 35. They are also slightly higher in monomer content. All three processed readily into DAP-fiberglass molding compounds and passed required physical property tests. One Osaka prepolymer was compounded into both asbestos and Orlon-DAP compounds on a production scale. Both compounds have passed all certification tests. The Bendix prepolymers were deliberately varied in mw and mw distribution and higher in monomer content than Dapon 35. Processing difficulties were encountered with both the lowest and highest molecular weight compounds, and the lowest molecular weight compound failed a number of physical property tests. The two intermediate molecular weight compounds processed readily and passed property tests. Guidelines were established for acceptable o-DAP prepolymers: (1) weight average mw (relative to polystyrene standards): 30,000 to 150,000; (2) mw distribution: 3.0 to ≦ 18.0; and (3) DAP monomer content: 1.0 to ≦ 6.0%. 5 figures, 6 tables.

24020 (LA-tr—81-5) **Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (III).** Kato, T.; Takamura, S. Translated from *Teion Kogaku ;* **15**: No. 3, 173-178(1980). Contract W-7405-ENG-36. 16p. NTIS, PC A02/MF A01. Order Number DE83009823.

Portions are illegible in microfiche products.

Organic insulators, such as polyimide, epoxy resins and fiber reinforced epoxies, (FRP), are irradiated in the fission reactor at about 5 K and their mechanical properties are measured in liquid helium without warm-up. At the very low temperature, the materials are completely brittle and the serration in the stress-strain curves takes place on polyimide, epoxy resins and CFRP. After irradiation of the absorbed dose 1.1 x 10^9 rad at about 5 K, the breaking stress of epoxy resins reduces by 30 to 40% and FRP and polyimide exhibit a little decrease in the mechanical strength. FRP and polyimide have good radiation resistance on the mechanical behavior after dose of ~ 1 x 10^9 rad as compared with other selected organic materials.

24021 (LA-tr—81-4) **Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (II).** Kato, T.; Takamura, S. Translated from *Teion Kogaku ;* **14**: No. 4, 178-183(1979). Contract W-7405-ENG-36. 16p. NTIS, PC A02/MF A01. Order Number DE83009822.

Portions are illegible in microfiche products.

Several organic insulators expected to be used in the construction of superconducting magnets in fusion reactors are irradiated in a fission reactor at about 5 K and the effect of radiation on their mechanical properties has been investigated at liquid nitrogen temperature. Breaking stress and yield stress of epoxy resins hardened by aromatic amine and aliphatic amine are reduced after irradiation of about 1 x 10^8 rad. Polyimide and fiber reinforced epoxy have high radiation resistance.

3604 Polymers And Plastics

REFER ALSO TO CITATION(S) 22919, 23432, 23439, 23842, 23969, 25021

24022 (DOE/ER/10421—4) **Effects on processing conditions on the reliability of cross-linked polyethylene-cable insulation. Progress report.** Phillips, P.J. (Utah Univ., Salt Lake City (USA). Dept. of Materials Science and Engineering). 1983. Contract AC02-79ER10421. 13p. NTIS, PC A02/MF A01. Order Number DE83008986.

There are three basic studies involved, each of which poses different experimental problems; however, progress on the second and third areas is highly dependent on success in the first: an investigation of the crystallization process in cross-linked polyethylene; an investigation of the effect of processing conditions on the morphology of miniature extruded cables; and an investigation of the effects of morphological and processing variables on dielectric loss and dielectric breakdown. Our investigations have concentrated on the first of these areas, which proved to be much more complex and difficult than originally envisioned. Research in the second and third areas is now underway; one part of the third area, that of dielectric loss effects, being now complete. These three areas are reviewed separately.

24023 (RFP-Trans—383) **Ferromagnetic porous plastics.** Moriya, M.; Hosoda, K.; Takai, M. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Feb 1983. Contract AC04-76DP03533. Translation of Japanese Kokai Patent Publication No. Sho 55-66933, 1980. 6p. NTIS, PC A02/MF A01. Order Number DE83008679.

Portions are illegible in microfiche products.

This claim concerns a process for producing a ferromagnetic porous plastic. The ferromagnetic porous plastic is obtained by mixing a plastic with finely powdered ferromagnetic material and then foaming the mixture in the presence of a foaming agent. Detailed procedures are presented for making these plastics by using: (1) polypropylene and cobalt ferrite powder; (2) polyethylene and magnesium ferrite; (3) 2,2-bis(p-1,2-epoxypropoxylphenyl) propane and cobalt ferrite powder; (4) polyvinyl chloride and powdered magnetite. A homogeneous dispersion of the ferromagnetic powder or foaming agent in the plastic can be obtained by adding surfactants such as stearic acid, oleic acid, lauric acid, linoleic acid, palmitic acid, as well as the salts of these acids. Ferromagnetic porous plastics can be used to remove suspended solids, colloidal substances, oils, organic compounds, algae, bacteria, microbes from municipal drinking water, sewage water and waste water. (ATT)

24024 **Polarons in quasi-one-dimensional systems.** Campbell, D.K.; Bishop, A.R.; Fesser, K. (Theoretical Division and Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 6862-6874(15 Dec 1982).

We discuss the nature of polaron excitations in two models of current interest in the study of quasi-one-dimensional materials: the coupled electron-phonon and molecular-crystal models. Using for definiteness parameters appropriate to trans-(CH)/sub x/, we show that, although qualitatively very similar, the two polarons differ quantitatively in many respects. We then consider the very weakly bound polaron limit and show that here the two polarons become identical. We indicate that this limit, although not applicable to trans-(CH)/sub x/, may be relevant to other interesting quasi-one-dimensional materials.

24025 **(BDX—613-2903) Qualities and processes of diallyl phthalate resin: translated from the Japanese.** Ninomiya, Y. Translated from *Nippon Setchaku Kyokaishi ;* **3**: 291-300(1967). Contract AC04-76DP00613. 34p. NTIS, PC A03/MF A01. Order Number DE83006619.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

With emphasis on the use of the diallyl phthalate resin in decorative laminates, the manufacturing method of the diallyl phthalate resin, mechanisms of its polymerization, and its features and applications are outlined. A demand for this resin originated from the need for plastic material to form a precisely finished shape since the initial development in the USA.

3606 Other Materials

REFER ALSO TO CITATION(S) 22938, 23155, 23159, 23164, 23174, 23266, 23267, 23284, 23284, 23355, 23355, 23355, 23439, 23610, 23776, 23842, 23891, 23969, 24003, 24718

24026 **(ANL/NESC—974) NONSAP-C; nonlinear stress concrete structures.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Taylor, C. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048974.

An out-of-core equation solver for large systems of linear equations allows practically unlimited problem size. The truss and tendon elements are assumed to have constant area. The tendon element cannot be used in geometrically nonlinear analyses. The membrane element can have from 4 to 8 nodes and the general three-dimensional isoparametric element from 8 to 21.

NONSAP-C is a finite element program for determining the static and dynamic response of three-dimensional reinforced concrete structures. Long-term, or creep, behavior of concrete structures can also be analyzed. Nonlinear constitutive relations for concrete under short-term loads are incorporated in two time-independent models, a variable-modulus approach with orthotropic behavior induced in the concrete due to the development of different tangent moduli in different directions and an elastic-plastic model in which the concrete is assumed to be a continuous, isotropic, and linearly elastic-plastic strain-hardening-fracture material. A viscoelastic constitutive model for long-term thermal creep of concrete is included. Three-dimensional finite elements available in NONSAP-C include a truss element, a multinode tendon element for prestressed and posttensioned concrete structures, an elastic-plastic membrane element to represent the behavior of cavity liners, and a general isoparametric element with a variable number of nodes for analysis of solids and thick shells.CDC7600; FORTRAN IV (CDC FORTRAN Extended); LTSS (CDC7600), SCOPE 2.1.5 (CDC7600); Approximately 115K (octal) words of small core memory and 345K (octal) words of large core memory and 19 disk files are used by the program..

24027 **(BNL—32589) Theory of anion ordering in TMTSF compounds.** Bruinsma, R.; Emery, V.J. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 7p. NTIS, PC A02/MF A01. Order Number DE83008583.

Portions are illegible in microfiche products.

A strong coupling theory is developed for anion ordering in $(TMTSF)_2X$, where X is a tetrahedral anion. The effect of pressure is considered and an explanation is found for the thermal-cycling effects in $(TMTSF)_2ClO_4$ and $(TMTSF)_2ReO_4$.

24028 **(BNL—32590) Some basic questions in organic superconductivity.** Emery, V.J. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 7p. NTIS, PC A02/MF A01. Order Number DE83008584.

Portions are illegible in microfiche products.

Several questions of current interest in the theory of organic superconductors are discussed. Particular attention is paid to the importance of low-dimensional physics, electron-electron interactions, and the specific role of the anions.

24029 **(CONF-810566—12) New method for the preparation of fast-conducting, reactive-glass systems.** Susman, S.; Boehm, L.; Volin, K.J.; Delbecq, C.J. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 2p. NTIS, PC A02/MF A01. Order Number DE83008501.

From International conference on fast ionic transport in solids; Gatlinburg, TN, USA (18 May 1981).

A conventional, nitrogen-purged glove box which has been modified for synthesizing glasses in a controlled environment at temperatures up to 1050°C is described. Sulphide glasses of the system $(1-x)Na_2S.xGeS_2$ have been prepared, while maintaining composition control, and with no evidence of either atmosphere or crucible contamination. The electrical conductivity of these glasses has been measured as a function of frequency in the range 1 Hz to 7×10^5 Hz and in the temperature range of -50°C to +150°C. A glass of composition 0.6 Na_2S:0.4 GeS_2 exhibits a conductivity of $1.0.10^{-3}\ \Omega^{-1}\ cm^{-1}$ (100°C), almost an order of magnitude higher than reported for the same composition prepared in the traditional way. (WHK)

24030 **(CONF-810736—3) XPS study of CaO in sodium silicate glass.** Veal, B.W.; Lam, D.J.; Paulikas, A.P.; Ching, W.Y. (Argonne National Lab., IL (USA); Missouri Univ., Kansas City (USA). Dept. of Physics). Jul 1981. Contract W-31-109-ENG-38. 17p. NTIS, PC A02/MF A01. Order Number DE83007889.

From Meeting on glass structures: surface and bulk; University Park, PA, USA (28 Jul 1981).

This paper shows that CaO added to silicate glasses behaves much like Na_2O in converting bridging oxygen sites to nonbridging sites. Good correspondence with model predictions was obtained but deviations were still sufficiently large to warrant attention. We speculate that some CaO may remain unreacted or that small-scale phase separation may occur. XPS core level shifts were monitored and possible charge-transfer effects were considered. Preliminary theoretical calculations utilizing a molecular-cluster approach were presented. XPS spectra for various glass compositions were simulated by appropriately combining local densities of state calculated for individual atoms. Dominant spectral features observed experimentally were found in the simulations. In conjunction with experiments, more carefully refined calculations will be subsequently examined. 7 figures.

24031 **(CONF-8010322—1) Molecular dynamics studies of superionic conductors.** Rahman, A.; Vashishta, P. (Argonne National Lab., IL (USA)). 1980. Contract W-31-109-ENG-38. 51p. NTIS, PC A04/MF A01. Order Number DE83008539.

From NATO school on superionic conductors; Odense, Norway (1 Oct 1980).

Structural and dynamical properties of superionic conductors AgI and CuI are studied using molecular dynamics (MD) techniques. Our model of these superionic conductors is based on the use of effective pair potentials. To determine the constants in these potentials, cohesive energy and bulk modulus are used as input; in

addition one uses notions of ionic size based on the known crystal structure. Salient features of the MD technique are outlined. Methods of treating long range Coulomb forces are discussed in detail. This includes the manner of doing Ewald sum for MD cells of arbitrary shape. Features which can be incorporated to expedite the MD calculations are also discussed. A novel MD technique which allows for a dynamically controlled variation of the shape and size of the MD cell is described briefly. The development of this novel technique has made it possible to study structural phase transitions in super-ionic conductors. For α-AgI, among the structural properties we have studied are: partial pair correlation functions, mean square displacements of iodines, cation density maps, Havens ratio, etc. The dynamical properties examined include cation self-diffusion, nature of cation jumps, bias in successive jumps, velocity auto correlation functions, current-current correlation functions. In CuI, we have examined the microscopic nature of $\gamma \rightarrow \alpha$ transition. It is found that at about 700 K the copper ions undergo an order-disorder transformation leading to a specific heat anomaly. The nature of the first-order transition and its precursor effects are also analyzed. In AgI the α reversible β transition is studied. In our model, upon heating β-AgI, the iodines undergo hcp→bcc transformation and the silver ions become mobile, whereas the reverse transformation is observed on cooling α-AgI.

24032 (DOE/ER/01198—1363) Raman measurements of folded interlayer shearing phonons in KC_{12}/sub n/ (n = 2 approx. 6). Wada, N.; Klein, M.V.; Zabel, H. (Illinois Univ., Urbana (USA)). 1981. Contract AC02-76ER01198. 6p. (CONF-810758—2). NTIS, PC A02/MF A01. Order Number DE81030939.

From Conference on physics of intercalation compounds; Trieste, Italy (6 Jul 1981).

Portions are illegible in microfiche products.

In this paper, experimental observations of the folded shearing phonons are presented. A simple nearest-neighbor linear chain model was used to extract the shearing force constants (SFC's) in these compounds. In our model the layer stacking sequence (ABAB ... for pristine graphite) is ignored, since the perturbation by the stacking sequence on the transverse acoustic phonon branch should be small. It is shown that the folded phonon energies depend on the specific sample used. This may indicate a variable layer stoichiometry of K layers in these compounds, although it is commonly believed that the stoichiometry of AGIC's is fixed with the composition MC_{12}/sub n/ (M = K, Rb, Cs and n = 2, 3 ...).

24033 (UCID—19727) Material properties for TR-55 and silicone elastomeric cushions. Feng, W.W.; Albertson, S.L.; Rosinsky, R.W. (Lawrence Livermore National Lab., CA (USA)). 5 Oct 1982. Contract W-7405-ENG-48. 17p. NTIS, PC A02/MF A01. Order Number DE83008442.

The notation of finite elastic theory for compressible rubber-like materials is introduced. The mechanics of data reduction, needed to determine the parameters of the theory, are displayed. the material properties of TR-55 rubber and silicone rubber cushions are obtained. The constitutive relation, with the material properties, correlates all uniaxial compressive data to a high degree of accuracy. The force-deformation relations of thin sheets of TR-55 in compression have been obtained. Further studies, both theoretical and experimental, on TR-55 thin sheets are needed to determine the force-deformation relation. 11 figures.

24034 Electrical characterization of grain boundaries in GaAs. Spencer, M.G.; Schaff, W.J.; Wagner, D.K. (Department of Electrical Engineering, Howard University, Washington, D.C. 20001). *Journal of Applied Physics;* **54**: No. 3, 1429-1440(Mar 1983).

Grain-boundary capacitance versus voltage, current versus voltage, and capacitance transient measurements are reported on lightly doped n-type GaAs bicrystals. The measurements are analyzed in terms of the abrupt depletion edge model in which the dominant current mechanism across the potential barrier formed by trapped charge at the interface is thermionic emission. The steady-state measurements are completely consistent with this model and provide grain-boundary parameters (barrier height, net carrier concentration in adjacent grains, and interface charge) necessary for interpreting capacitance transient measurements. The latter, made on a bicrystal specially selected for uniformity of the grain-boundary barrier, reveal the presence of two closely spaced levels at 0.62 and 0.74 eV below the conduction band edge. The capture cross section associated with the dominant lower level is measured directly by two methods and falls in the range 10^{-14}—10^{-13} cm^2.

24035 Electron spin resonance study of radiation-induced electrically active paramagnetic centers at the Si/SiO_2 interface. Lenahan, P.M.; Dressendorfer, P.V. (Sandia National Laboratories, Albuquerque, New Mexico 87175). *Journal of Applied Physics;* **54**: No. 3, 1457-1460(Mar 1983). Contract AC04-76DP00789.

We have compared the generation of radiation-induced P/sub b/ ("trivalent silicon") centers at the Si/SiO_2 interface with the radiation-induced buildup of interface states. We observe a strong correlation between the density of P/sub b/ centers and radiation-induced interface state density (D/sub it/) and similar annealing behavior of radiation-induced P/sub b/ and D/sub it/. Furthermore, the P/sub b/ resonance intensity is strongly bias dependent; this indicates that the charge state of the P/sub b/ defect is bias dependent. We conclude that P/sub b/ defects account for a very large portion of radiation-induced interface states.

24036 Preparation of in situ doped hydrogenated amorphous silicon by homogeneous chemical vapor deposition. Meyerson, B.S.; Scott, B.A.; Wolford, D.J. (IBM T. J. Watson Research Center, Yorktown Heights, New York 10598). *Journal of Applied Physics;* **54**: No. 3, 1461-1465(Mar 1983).

Raman scattering, infrared absorption, conductivity measurements, electron microprobe, and secondary ion mass spectrometry (SIMS) were used to characterize boron and phosphorus doped hydrogenated amorphous silicon (a-Si:H) films prepared by Homogeneous Chemical Vapor Deposition (HOMOCVD). HOMOCVD is a thermal process which relies upon the gas phase pyrolysis of a source (silane containing up to 1.0% diborane or phosphine) to generate activated species for deposition upon a cooled substrate. Doped films prepared at 275 °C by this process were found to contain ~ 12-at. % hydrogen as determined by infrared absorption. We examined dopant incorporation from the gas phase, obtaining values for a distribution coefficient C/sub D/ (film dopant content/gas phase dopant concentration, atomic basis) of $0.33 <$ or $= C/sub\ D/ <$ or $= 0.63$ for boron, while $0.4 <$ or $= C/sub\ D/ <$ or $= 10.75$ in the limits $3.3 \times 10^{-5} <$ or $= PH_3/SiH_4 <$ or $= 0.004$. We interpret the data as indicative of the formation of an unstable phosphorus/silicon intermediate in the gas phase, leading to the observed enhancements in C/sub D/ at high gas phase phosphine content. HOMOCVD films doped at least as efficiently as their prepared counterparts, but tended to achieve higher conductivities [$\sigma >$ or $= 0.1\ (\Omega\ cm)^{-1}$ for 4.0% incorporated phosphorus] in the limit of heavy doping. Raman spectra showed no evidence of crystallinity in the doped films. Film properties (conductivity, activation energy of of conduction) have not saturated at the doping levels investigated here, making the attainment of higher "active" dopant levels a possibility. We attribute the observation that HOMOCVD appears more amenable to high "active" dopant levels than plasma techniques to the low (~ 0.1 eV) thermal energy at which HOMOCVD proceeds, versus ~ 10—100 eV for plasma techniques.

24037 Effect of geometric deformation of tetrahedral bonding on the vibrational properties of Group-IV semiconductors: Si in the BC-8 structure. Goldberg, A.; El-Batanouny, M.; Wooten, F. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 12, 6661-6668(15 Dec 1982). Contract W-7405-ENG-48.

The phonon dispersion curves and phonon density of states for silicon in the BC-8 structure have been calculated with the use of Weber's adiabatic-bond-charge model. All parameters were scaled in an unambiguous physical manner from Weber's values for silicon in the diamond structure. The frequency values at Γ agree to within 10% of those values available from Raman spectroscopy. The Γ_1^- mode is compatible with a transformation from the BC-8 structure to the wurtzite structure, a transformation that takes place upon heating the BC-8 polymorph.

24038 Time-resolved optical studies of silicon during nanosecond pulsed-laser irradiation. Lowndes, D.H.; Jellison, G.E. Jr.; Wood, R.F. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 6747-6755(15 Dec 1982).

The time-resolved optical transmission (at 1152-nm wavelength) and reflectivity (at both 633 and 1152 nm) of crystalline silicon have been measured with ~nanosecond resolution during and immediately after pulsed-ruby-laser irradiation (694 nm, full width at half maximum pulse duration 14 nsec), over a range of pulsed-laser energy densities E/sub l/. For E/sub l/> or =0.8 J/cm^2 the transmission is found to go to zero and to remain at zero for a time proportional to E/sub l/ (during which time the reflectivity is also at a maximum value), and then to recover (in ~500 nsec) to its initial value. The zero-transmission result during the high-reflectivity phase contradicts reports of other similar experiments. Measured reflectivities during the high-reflectivity phase agree with reflectivities calculated from the known optical constants of molten silicon, at both the 633- and 1152-nm probe wavelengths. Intense near-band-gap photoluminescence is also observed from our silicon samples, for E/sub l/ both above and below the threshold for the high-reflectivity phase. The results of detailed calculations using the thermal-melting model are presented. Good quantitative agreement is found between the results of these calculations and the measured melting threshold of 0.8 J/cm^2, and with the reflectivity and transmission of crystalline silicon, as functions of time and E/sub l/. The small (< or ≈10%) absorption due to long-lived laser-induced free carriers is also calculated and found to be in satisfactory agreement with the measured transmission for long (> or ≈100 nsec) times after pulsed-laser irradiation. The results are discussed in relation to other recent time-resolved measurements during pulsed-laser irradiation of silicon.

24039 Self-consistent electronic structure of realistic models of amorphous hydrogenated silicon. Guttman, L.; Fong, C.Y. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 6756-6775(15 Dec 1982).

The self-consistent pseudopotential method has been used to calculate the electronic structure of periodic models of amorphous hydrogenated silicon containing 7 to 13 at. % of hydrogen, both as monohydride and as dihydride. The total density of states, involving almost entirely the silicon valence electrons, has two unequal maxima in the occupied region, followed by a region of very low (possibly zero) density before rising again rapidly in the energy range that is empty of electrons in the ground state. These features vary only a little from one example to another, and are not very dependent on the number of atoms in the repeating unit or the number of plane waves in the basis set. The distribution in energy of the occupied states having large densities near the hydrogen atoms is found to be quite different, depending on whether the atoms are attached singly to silicon or in pairs. In all cases, the electron density along the Si-H axes shows the variation expected for filled bonding states and empty antibonding states. In general, states amounting to a small fraction of the total appear just below the bottom of the valence band. These are associated in at least one case with a three-center bond joining a hydrogen atom and two silicon atoms.

24040 Temperature dependence of the nuclear positions and spontaneous polarization in pyroelectric $Ba(NO_3)_2xH_2O$. Liminga, R.; Abrahams, S.C.; Glass, A.M.; Kvick, A. (Institute of Chemistry, University of Uppsala, Box 531, S-75121 Uppsala, Sweden). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 6896-6900(15 Dec 1982).

The nuclear positions in a single crystal of $Ba(NO_3)_2xH_2O$ at 20, 102, and 298 K have been measured by neutron diffraction, and the change in spontaneous polarization between 20 and 300 K has been continuously determined. A polarization change of -30 x 10^{-4} Cm^{-2} between 102 and 298 K is calculated from the nuclear positions, based upon an electric dipole moment of 6.2 x 10^{-30} C m for H_2O and 6 x 10^{-30} C m for NO_3^- and the charge on NO_3^- as midway between the oxygen atoms. Integral ionic charges are assumed. The measured polarization change between 102 and 298 K is -26 x 10^{-4} C m^{-2}. The calculated polarization change between 20 and 102 K is -5 x 10^{-4} C m^{-2}; the experimental value is +3 x 10^{-4} C m^{-2}. The error in the calculated spontaneous polarization is estimated at 10 x 10^{-4} C m^{-2}.

24041 Hydrostatic pressure effects on the superconductivity of La/sub 1.2-x/Eu/sub x/MO_6S_8 pseudoternary compounds. Torikachvili, M.S.; Maple, M.B.; Guertin, R.P.; Foner, S. (Institute of Applied Physical Sciences, University of California-San Diego, La Jolla, California). *Journal of Low Temperature Physics;* **49**: No. 5, 573-584(1 Dec 1982). Contract AT03-76ER70227.

The effect of hydrostatic pressure on the superconductivity of La/sub 1.2-x/Eu/sub x/Mo_6W_8 pseudoternary compounds was studied by means of low-frequency ac and dc magnetic susceptibility measurements up to 20 kbar. The superconducting transition temperature T/sub c/ at ambient pressure is a weakfunction of Eu concentration x for 0< or ≈x< or ≈0.2, and then decreases smoothly with x for x>0.2 until superconductivity is completely suppressed for x> or =0.95. Pressure was found to decrease T/sub c/ in the La-rich compounds and to increase T/sub c/ in the Eu-rich compounds. Pressure also induces superconductivity in compounds with x>0.95 that are not superconducting at ambient pressure. A La/sub 0.2/Eu/sub 1.0/Mo_6S_8 compound revealed a sizeable Meissner effect for pressure larger than 7 kbar.

24042 Megavolt arsenic implantation into silicon. Byrne, P.F.; Cheung, N.W. (California Univ., Berkeley (USA). Dept. of Electrical Engineering and Computer Sciences); Sadana, D.K. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.). *Thin Solid Films;* **95**: No. 4, 363-367(24 Sep 1982).

From International conference on metallurgical coatings and process technology; San Diego, CA (USA) (5 - 8 Apr 1982).

Implantations of arsenic at 11 MeV have been performed into Si(100) substrates at room and liquid nitrogen temperatures. The residual damage after annealing has been observed using Rutherford backscattering and cross-sectional transmission electron microscopy. In situ annealing is shown to be more important for room temperature implantation compared with liquid nitrogen temperature implantation. Spreading resistance has been used to determine active carrier concentrations, and the measured range of 4.4 μm agrees with Linhard-Scharff-Schioett calculations.

24043 Influence of particle size on the sintering kinetics of ultrapure sodium chloride. Thompson, R.J.; Munir, Z.A. (Univ of Calif, Davis, USA). *Journal of the American Ceramic Society;* **65**: No. 6, 312-316(Jun 1982).

Results are presented of an investigation of the effects of particle size in the sintering of sodium chloride in air at the temperature range of 973 to 1048 K. 13 refs.

24044 Neutron powder diffraction study of the lithium insertion compound $LiMoO_2$ from 4 to 440°k. Cox, D.E.; Cava, R.J.; McWhan, D.B.; Murphy, D.W. (Brookhaven Natl Lab, Upton, NY, USA). *Journal of Physics and Chemistry of Solids;* **43**: No. 8, 657-666(1982).

The structure of lithium inserted rutile-based compound LiMoO/sub 2/ has been determined from neutron powder diffraction data by use of the Rietveld profile technique. The inserted Li is incorporated into the MoO/sub 2/ lattice in octahedral sites with an average Li-O distance of 2.12 A. The Mo atoms also occupy octahedral sites with an average Mo-O distance of 2.12 A, and form Mo-Mo pairs with a separation of 2.46 A. LiMoO/sub 2/ can best be regarded as having a distorted NiAs-type structure rather than one of rutile-type. No changes in structure were observed in the temperature range 4-440K. 11 refs.

24045 Chemical diffusion in a one dimensional lattice with two sites inequivalent. Murch, G.E. (Argonne Natl Lab, IL, USA). *Journal of Physics and Chemistry of Solids;* **43**: No. 8, 773-776(1982).

Making use of the exact form of the Nernst-Einstein equation and an exact expression for the d.c. ionic conductivity derived by P.M. Richards, the author has derived an exact expression for the chemical diffusion coefficient in a one dimensional lattice with

two sites inequivalent and self-blocking by the atoms. It was found that the chemical diffusion coefficient is independent of concentration. This particular result, however, can apply only to the one dimensional lattice. 19 refs.

40 CHEMISTRY

4001 Analytical And Separations Chemistry

REFER ALSO TO CITATION(S) 23085, 23088, 23191, 23193, 23975, 24070, 24318, 24324

24046 (CONF-810740—3) Influence of detector geometry on AEM-based x-ray microanalysis. I. Theoretical. Zaluzec, N.J.; Maher, D.M.; Mochel, P.E. (Argonne National Lab., IL (USA); Bell Telephone Labs., Inc., Murray Hill, NJ (USA); Illinois Univ., Urbana (USA). Materials Research Lab.). Jul 1981. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83007907.

From 3. analytical electron microscopy workshop; Vail, CO, USA (13 Jul 1981).

There are presently three different detector/specimen configurations available on analytical electron microscopes (AEM's) used for x-ray microanalysis with energy dispersive Si(Li) detectors. These different geometries can be described by specifying the detector elevation and azimuthal angles (θ/sub E/ and θ/sub A/ respectively) as well as the detector-to-specimen distance which defines the subtended solid (Ω). The advantages of maximizing θ/sub E/ in an AEM were pointed out by the calculations of Zaluzec in terms of maximizing the characteristic peak-to-background (P/B) ratio to obtain maximum sensitivity. In this paper we consider the effects of θ/sub E/ on quantitative analysis in terms of its affect on the absorption correction for the three detector geometries (low, intermediate, and high). (WHK)

24047 (DOE/ER/00854—39) Fractionations of non-porphyrin complexes of vanadium and nickel from Boscan crude oil. Crouch, F.W.; Sommer, C.S.; Galobardes, J.F.; Kraus, S.; Schmauch, E.H.; Galobardes, M.; Fatmi, A.; Pearsall, K.; Rogers, L.B. (Georgia Univ., Athens (USA). Dept. of Chemistry). Feb 1983. Contract AS09-76ER00854. 54p. NTIS, PC A04/MF A01. Order Number DE83008555.

Samples containing vanadium and nickel non-porphyrin complexes were isolated from Boscan crude oil from Venezuela. Chromatographic studies indicated that a broad molecular weight range of components existed so that silica packings having a 300 A average pore diameter were superior to those in the range 60 A to 100 A due to greater permeation. Solvents having widely different polarities and selectivities were needed for elution of non-porphyrins from 300 A pore diameter silica derivatized with trimethylchlorosilane. Successive solvents eluted different percentages of the metals and of uv-visible absorbing components. Larger molecular-weight species, which contained the bulk of the metals, were eluted by chloroform, methylene chloride, and tetrahydrofuran. Results also suggested the existence of slow equilibria between high and low molecular weight species within a particular non-porphyrin fraction. When asphaltenes were precipitated from a sample of crude oil by n-hexane, most of the vanadium and nickel was found in that higher molecular-weight fraction. Further fractionation of the soluble (maltene) fraction using neutral alumina showed that most of the maltenes could be recovered as separate hydrocarbon, porphyrin, non-porphyrin and tetrahydrofuran fractions. In contrast, only approximately fifty percent of the asphaltenes (and metals) were recovered by an analogous procedure. Furthermore, when separating the asphaltenes into porphyrin and non-porphyrin fractions, an approximately one-to-one split of vanadium and nickel between the porphyrins and non-porphyrins was observed for both, whereas most of the vanadium and nickel was isolated from the maltenes as non-porphyrins. Finally, it was found that a procedure utilizing sulfuryl chloride for non-porphyrin demetallation was superior to a procedure employing methane-sulfonic acid.

24048 (HMI—373, pp 152) Detection of trace elements with heavy ions. Scheer, J.; Maywald, C.; Rieks, H.H.; Kirschke, P.; Wehrse, R.; Schreiber, P. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24049 (KFK—3387) Analytical applications of neutron capture gamma-ray spectroscopy. Hassan, A.M.; Gantner, E.; Mainka, E.; Ruf, H.; Kuhnes, U.; Mostafa, M. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Radiochemie). Jul 1982. 40p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750134.

Prompt gamma-rays from thermal induced nuclear reactions have been used to estimate the boron, chlorine and phosphorus contents in industrial and reference materials. A neutron capture gamma-ray spectroscopy facility for analytical purposes using 252-Cf sources has been designed and calibrated. The facility is principally designed for the measurement of the prompt gamma-ray spectra obtained due to thermal neutron capture by means of the internal target geometry. The capture spectra were recorded using a high resolution Ge(Li) system. The designed facility and the system used in this work are described in detail. A weight of 50 to 100 gm of each sample in a power or liquid form encapsulated in a polyethene container was used. Sensitivity curves using different standard concentration values of B, Cl and P, were constructed. The concentration range was from 0.005 to 30%.

24050 (MLM—3047) Isotachophoresis. Kapsch, D.M. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 17 Mar 1983. Contract AC04-76DP00053. 12p. NTIS, PC A02/MF A01. Order Number DE83008793.

Isotachophoresis involves the migration of ion species of the same sign, all with a common counter-ion under the influence of an electric field. A solution containing the ions to be analyzed is injected between a leading and a terminating electrolyte. The leading electrolyte contains one ion of the same sign as the sample ions with an effective mobility higher than any of the sample ions. The terminating electrolyte also contains only one ion of the same sign as the sample ions and has an effective mobility lower than any of the sample ions. The total electrical current through the capillary containing the sample, leading electrolyte, and terminating electrolyte is constant; therefore, all ions move at the same velocity. The sample with the highest effective mobility will move first, and others will follow in order of decreasing effective mobility. Since sample ions are the only charge carriers in their zone, all zones remain in contact with one another. Small sample requirements of around a picomole, a total analysis time of 10 to 30 min, and ease of quantification are among the virtues of this technique. 4 figures, 2 tables.

24051 (PB—83-146175) Inorganic compound identificatioon of fly ash emissions from municipal incinerators. Final report. Henry, W.M.; Barbour, R.L.; Jakobsen, R.J.; Schumacher, P.M. (Battelle Columbus Labs., OH (USA)). Dec 1982. 37p. NTIS, PC A03/MF A01.

Particulate matter emitted as fly ash from municipal refuse and sludge incineration operations consists largely (>90 percent) of inorganic species, including soot. Although commonly these inorganics are referred to as oxides, it is evident from the compositions of the waste being combusted that chlorides, sulfates, and, in the case of sludge, phosphates are potential reactant products in the combustion process. This report presents a brief summary of existing data on the composition of ashes resulting from various municipal refuse and sludge incineration operations and new data as to the inorganic compounds present. Several samples of stack emission fly ash were collected and analyzed in detail for their elemental contents in order to provide insight as to the potential inorganic compounds possibly present. Then compound identification work was performed by X-ray diffraction (XRD) and Fourier Transform infrared (FT-IR) techniques. The compound analyses showed the presence of many inorganic compounds in addition to oxides in the fly ashes. The use of the FT-IR technique is detailed in the report

because its application to inorganic species identification is relatively new.

24052 (PNL-SA—11151) Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry. Stoffels, J.J. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 9p. (CONF-821178—1). NTIS, PC A02/MF A01. Order Number DE83008438.

From DOE Basic Energy Sciences meeting; Washington, DC, USA (17 Nov 1982).

Portions are illegible in microfiche products.

Direct-inlet mass spectrometry is a method for analysis of individual particles without manually locating and isolating them. In this method, particles entrained in air are admitted directly into the ion source of a surface-ionization mass spectrometer. Although the method has so far been considered only for the real-time analysis of airborne particles, it also has potential for the analysis of particles in collected samples. For the latter application, the particles would be resuspended from a collecting medium and introduced into the direct-inlet mass spectrometer. Both micrometer and submicrometer particles would be analyzed. The isotopic composition of the uranium or plutonium contained in each individual particle would be measured. 6 figures.

24053 (RFP-Trans—391) Behavior of tetravalent plutonium with various ion exchangers in solutions containing nitric acid and oxalates. Walter, E.; Ali, S.A. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Feb 1983. Contract AC04-76DP03533. Translation of KfK 2805, April 1979. 21p. NTIS MF A01. Order Number DE83008680.

Microfiche only, copy does not permit paper copy reproduction.

The distribution behavior of tetravalent plutonium on the ion-exchange resins Dowex 50W-X8, Dowex 1-X8 and Dowex Chelating Resin Al-X8 in the presence of various concentrations of nitric acid and oxalate was studied. It was found that nitric acid and oxalic acid influence each other during complex formation. The doubts that formation of Pu(IV) nitrato complexes in nitric acid cannot be disregarded during complexing of Pu(IV) with oxalate ions are justified. The Pu(IV) $(C_2O_4)_3^{2-}$ complex forms only at low nitric acid concentrations and high oxalate concentrations. Separation of Pu(IV) from nitric acid solution in the presence of fairly high oxalate concentrations is possible on Dowex Chelating Resin if the nitric acid concentration does not exceed 0.25 M. 8 figures, 4 tables.

24054 (RFP-Trans—378) Process for removal of organic solvents. Yamaauchi, F. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Feb 1983. Contract AC04-76DP03533. Translation of Japanese Kokai Patent Publication No. Sho 53-147693, 1978. 5p. NTIS, PC A02/MF A01. Order Number DE83008677.

A process is claimed for removing organic solvents by contacting the organic solvent vapor with a magnetic powder, so that the organic solvent is adsorbed on the magnetic powder. The magnetic powder is then removed from the gas and heated to drive off the organic solvent. Both organic solvent and magnetic pwder can be recycled. (ATT)

4002 Inorganic And Physical Chemistry

REFER ALSO TO CITATION(S) 22921, 22936, 23113, 23891, 24010, 24043, 24078

24055 (ANL/NESC—826R) PHOS1; pH & conductivity of sodium phosphate solutions. Wright, J.M.; VonNieda, G.E. (SEE CODE- 0806000 Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048826.

PHOS1 calculates the pH and conductivity of sodium phosphate solutions. The equations are applicable for calculation of pH over the temperature range 0 to 300 degrees C; the equations for conductivity are valid over the temperature range of 0 to 50 degrees C.DEC10; BASIC; TOPS-10; Standard DEC10.

24056 (CONF-810860—12) Ostwald ripening of precipitates and irreversible phenomena. Chan, S.K. (Argonne National Lab., IL (USA)). Aug 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007888.

From ASM international conference on solid-solid phase transformations; Pittsburgh, PA, USA (10 Aug 1981).

In principle, the manner according to which a phase transformation proceeds should be determinable by irreversible thermodynamics just as well as by appropriate kinetic equations embodying the transport of matter or energy. In practice, however, the former is seldom invoked and the latter approach provides the exclusive description of the transformation leaving one wondering what role the former plays. In this paper, the problem of Ostwald ripening of precipitates is studied to throw light on the underlying irreversible thermodynamics. From a path integral solution, it is shown that the size distribution evolves in such a manner that a Lagrangian is minimized. This Lagrangian is the sum of the dissipation potentials in the flux and force representations minus the rate of entropy production. The coarsening process proceeds in accordance with Onsager's principle of least dissipation. The implications of this study in relation to other irreversible phenomena are also discussed.

24057 (CONF-811242—2) Transmission and backscatter Moessbauer spectroscopy of zeolite Fe (and Fe-Co) synfuel catalysts. Mulay, L.N.; Lo, C.; Rao, K.R.P.M.; Obermeyer, R.; Rao, V.U.S. (Pennsylvania State Univ., University Park (USA); Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1981. Contract FG22-80PC30250. 4p. NTIS, PC A02/MF A01. Order Number DE83008445.

From International conference on the applications of the Moessbauer effect; Jaipur, India (14 Dec 1981).

Portions are illegible in microfiche products.

The reduced and carbided ZSM-5 (14.7% Fe) showed spectra corresponding to (a) Fe^0 (~ 85% reduction) and to (b) (Fe_5C_2) respectively. The used catalysts showed mixtures of (b), presumably the active phase, and (c) Fe_3C. The backscatter spectra of Fe-Co (selective) catalyst revealed absence of Fe in the 30 nm layer, which was confirmed by Ion Scattering Spectroscopy. Differences in surface composition and product distribution are discussed. 3 figures, 1 table.

24058 (CONF-820508—8) Structure and conductivity of the NASICON analog $Na_3SC_2(PO_4)_3$. Susman, S.; Delbecq, C.J.; Brun, T.O.; Prince, E. (Argonne National Lab., IL (USA); National Measurement Lab. (NBS), Washington, DC (USA)). 1982. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83007670.

From Spring meeting of the Electrochemical Society; Montreal, Canada (9 May 1982).

Portions are illegible in microfiche products.

Neutron and x-ray diffraction data of $Na_3SC_2(PO_4)_3$ are presented that show the transition from an ordinary-conducting, high temperature phase to a still higher temperature, superionic conducting phase. There are at least four polymorphic modifications. At room temperature, the refined neutron diffraction data confirm the Cc space group reported by Efremov and Kalinin but with a = 16.0449(24), b = 8.9225(15), c = 9.0656(13)A, β = 126.918(21), R/sub weighted pattern/ = 17.5%, and R/sub expected/ = 7%. Between 25°C and 64°C, a second polymorph appears. The structure is monoclinic but has not yet been refined. At 64°C, a third polymorph C appears. It is rhombohedral R3c. Using hexagonal axes, a = 8.9273(2), c = 22.3668A, R/sub wp/ = 6.28% and R/sub e/ = 3.83% at 100°C. At 166°C, the high temperature polymorph D appears. It is the superconducting phase of NASICON(Sc). It, too, is rhombohedral R3c with a = 8.9274(1), c = 22.5493(6)A, R/sub wp/ = 5.81% and R/sub e/ = 3.87% at 225°C. The diffraction data are correlated with ionic conductivity measurements as a function of temperature.

24060 **(DOE/ER/71015—T1) Synthetic and catalytic studies directed toward homogeneously catalyzed selective oxidation. Final report.** (Washington State Univ., Pullman (USA)). 1982. Contract AT06-76ER71015. 4p. NTIS MF A01. Order Number DE83008383.

Microfiche only, copy does not permit paper copy reproduction.

This final report briefly summarizes achievements made on catalyzed oxidation of carbon monoxide and ketones by transition metal carbonyl complexes. Only $Rh(CO)_{16}$ catalyzed the oxidation of CO under ambient conditions. A necessary condition for oxidation to occur is the facile substitution of PPh_3 into the coordination sphere of the metal catalytic oxidation of aliphatic ketones by rhodium and rhenium carbonyl complexes lead to the formation of carboxylic acids. Mechanistically the reaction proceeds via hydroperoxide and peracid intermediates. The catalysts accelerate the decomposition of hydroperoxide and peracid to carboxylic acids.

24060 **(KFK—3338) Investigations on the improvement of activated alumina adsorbents.** Hahn, R. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Radiochemie; Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Chemie). Jul 1982. 114p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750135.

Thesis.

Activated aluminas were prepared by precipitation with ammonia and calcination at temperatures of 400°C to 900°C. Adding of Ca-ions to the precipitation mixture yield Ca-doped aluminas. The porosity-structure was investigated by exclusion chromatography. As shown by the X-Ray analysis the activated aluminas belong all to the Haber's Gamma-serie. Doping with Ca gave a yield of about 10% the specific surface area is practically constant in the region 0,1 to 2% if the precipitation pH is kept constant. Passing a strong stream of air (dynamic activation) over the hydroxide during calcination gives activated aluminas with higher surface areas as by static activation (without airpassing). The maximum specific surface area received was 422 m^2/g at a calcination temperature of 600°C. The doped aluminas are thermally more stable than undoped aluminas. Dynamic regeneration results in a smaller decrease of specific surface area than static regeneration (without airstream). Pore volume distribution of all investigated 600°C-aluminas shows a maximum of the pore diameter at roughly 30 A. Dynamic activation leads to aluminas with great pores and high surface areas. The adsorption capacity for ligninsulfonacid increases if the average pore diameter of the aluminas exceed 100 A. Comparing the pore volume distribution of charcoal and activated aluminas shows that nearly 70% of the pore volume of the charcoal belong to the micropore region whereas the part of the aluminas is at most 50%. The activation has a greater influence on the quality of the aluminas than the precipitation pH.

24061 **Charge transfer complexes of molecular oxygen in $NaClO_3$ and $KClO_3$ studied by resonance Raman and infrared spectroscopy.** Bjerre, N.; Bates, J.B. (Department of Chemistry, Aarhus University, DK-8000 Aarhus C, Denmark). *Journal of Chemical Physics;* **78**: No. 5, 2133-2143(1 Mar 1983).

The complex point defects $[ClO^-,O_2]$ and $[ClO^-_2,O_2]$, formed by photolysis of crystalline $NaClO_3$ and $KClO_3$ at 15 or 77 K, were studied by resonance Raman and infrared spectroscopy. The vibrational frequencies correspond closely to those of the individual species whereas a variety of other properties is peculiar to the complexes. Thus, they have optical absorptions in the visible spectral region, the vibrations of both components are resonance Raman active under excitation with visible light, and the vibration of O_2 is active in the infrared. A model which accounts for these properties in terms of charge transfer between the two components of the complex is described. Estimates based on the intensities of the infrared and optical absorptions suggest that 0.01—0.03 electron is transferred from ClO^- to O_2 in the ground state of the complex. The effects of the librational motion of the O_2 molecules and the photoinduced reorientations of some of the defects are described.

24062 **Dynamics of association and decay. A model study of $Cl^- VCl_2$ arrow-right-left Cl/sup -asterisk/$_3$ using quasiclassical trajectories.** Babcock, L.M.; Thompson, D.L. (University of California, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* **78**: No. 5, 2394-2401(1 Mar 1983).

Quasiclassical trajectories on a model potential-energy surface have been used to study $Cl^- + Cl_2$ arrow-right-left $[Cl^-_3]($. Rate coefficients are reported for both the forward and backward processes. Decay rate constants as a function of energy and thermal rate coefficients for forming $[Cl^-_3]($ complexes that live for a given number of inner turning points in the $Cl^- + Cl_2$ relative motion are reported.

24063 **Reaction-path interpolation models for variational transition state theory.** Truhlar, D.G.; Kilpatrick, N.J.; Garrett, B.C. (Department of Chemistry, University of Minnesota, Minneapolis, Minnesota 55455). *Journal of Chemical Physics;* **78**: No. 5, 2438-2442(1 Mar 1983).

We present interpolation formulas for estimating parameters in the reaction-path Hamiltonian from known data in three vicinities: reactants, saddle point, and products. Whereas conventional transition state theory calculations are usually based on a quadratic expansion of the potential energy surface at the saddle point, the present approach attempts to estimate the variational transition state theory rate constant by also using selected cubic and quartic force constants of the saddle point or by using quadratic force constants determined over a small range of the reaction path, not necessarily including the variational transition state. The method is illustrated and the formulas are tested for four collinear classical reactions.

24064 **Multistate kinetics of nucleation in the presence of an aerosol.** McGraw, R.; Marlow, W.H. (Environmental Chemistry Division, Department of Energy and Environment, Brookhaven National Laboratory, Upton, New York 11973). *Journal of Chemical Physics;* **78**: No. 5, 2542-2548(1 Mar 1983).

The classical Becker—Doering homogeneous nucleation theory is rigorously extended to include monomer and cluster removal mechanisms capable of coupling to the usual Becker—Doering equations for evaporation and growth. Exact expressions are obtained in a compact continued fraction form for the steady state cluster distribution and nucleation rate in the presence of an aerosol. The unmodified classical theory is recovered in the limit of a particle free vapor. Recently proposed models for new particle formation in the presence of an aerosol and nucleation in a nonuniform vapor are shown to be contained within the present formulation. Condensation curves are calculated for a series of model condensable vapor species covering a wide volatility range in the presence of an aerosol. For those vapors having low equilibrium vapor pressures (less than 10^{-8} Torr at the highest aerosol concentrations considered) significant departures from predictions based on the unmodified classical theory are found.

24065 **Reactive quantum Boltzmann equations: A derivation from an arrangement channel space representation and BBGKY hierarchy.** Evans, J.W.; Hoffman, D.K.; Kouri, D.J. (Ames Laboratory and Department of Chemistry, Iowa State University, Ames, Iowa 50011). *Journal of Chemical Physics;* **78**: No. 5, 2665-2681(1 Mar 1983).

A rigorous derivation of the reactive quantum Boltzmann equations is presented for systems where breakup and recombination are excluded. The use of an arrangement channel space representation allows an exact decomposition of the N particle density matrix into components for different chemical compositions and an exact definition of reduced species density matrices (as opposed, e.g., to standard projection operator techniques). This necessitates the use of the combinatorially complex arrangement channel BBGKY hierarchy which, however, avoids the need for the usual heuristic specification of collision terms. Another advantage is that scattering equations generated for the reactive and nonreactive many body T matrices appearing in the Boltzmann equations have "well-behaved" kernels (unlike the corresponding Lippmann—Schwinger equations). From the derived equations we readily

obtain, e.g., reaction-diffusion equations and nonequilibrium expressions for the chemical reaction rates.

24066 **Thermodynamics of molten sulfate mixtures.** Misra, A.K.; Whittle, D.P.; Worrell, W.L. (Univ of Calif, Berkeley, USA). *Journal of the Electrochemical Society;* **129**: No. 8, 1840-1845(Aug 1982).

Quantitative studies of the formation of low melting point sulfates were made by equilibrating NiO-Na/sub 2/SO/sub 4/ mixtures with argon-SO/sub 2/-SO/sub 3/-air mixtures of different compositions in the temperature range 1000-1173 K. Using these data and the Na/sub 2/SO/sub 4/-NiSO/sub 4/ phase diagram, the enthalpy of fusion and melting temperature of NiSO/sub 4/ were estimated. An equation is given for the free energy change for the reaction NiO(s)+SO/sub 3/(g)?NiSO/sub 4/(l) (dissolved in Na/sub 2/SO/sub 4/). This has then been used to calculate the minimum P/sub SO(3)/ required for liquid sulfate formation. Similar calculations were carried out from existing data for the CoSO/sub 4/-Na/sub 2/SO/sub 4/ system, and verified by a limited number of experiments. The calculated minimum P/sub SO(3)/ required for liquid sulfate formation is approximately an order of magnitude lower for Co-base alloys compared with Ni-base alloys, and the implications of this with regard to hot corrosion are briefly discussed. 16 refs.

24067 **Temperature dependence of dispersive hopping transport and diffusion in disordered solids.** Hamill, W.H. (Univ of Notre Dame, Indiana, USA). *Journal of Physics and Chemistry of Solids;* **43**: No. 6, 559-562(1982).

The time- and temperature-dependent drift mobility /mu/sub //d for dispersive transients in disordered solids is /mu/sub //d(T, t)?L/Et/sub T/ in terms of distance L, field E and transit time t/sub T/. Since current I/varies directly as/t/sup -(1-//alpha//sup)/ for t<t/sub T/ and 0</alpha/<1 by Scher--Montroll theory for hopping among localized states, it follows that /mu/sub //d(T)?/alpha/[/mu/sub //d(T, t)]/sup //alpha/ (L/E/tau/)/sup 1-//alpha/ where /tau/sub a/pproximately equals/10/sup -13/s is estimated. Further /mu/sub //d(T)/varies directly as/exp(-/DELTA/sub //0/kT) and the activation energy /DELTA/sub //0 is time independent. On this basis /DELTA/ for the carbazole polymers is ca. zero, that for a-Se is ca. 0.05 eV, and that for a-As/sub 2/Se/sub 3/ is 0.35 eV rather than 0.5, 0.3 and 0.6 eV respectively on a phenomenological basis for /mu/sub //d(T, t). Trap-controlled hopping transport may be excluded. Time-resolved optical studies of excess carrier recombination supplement mobility measurements in a-Si: H and a-As/sub 2/Se/sub 3/ as well as other systems. Combined results suggest a dielectric response mechanism in which the time-dependent hopping frequency of localized carriers /nu/sub v/aries directly as/t/sup //alpha//sup -1/ arises from distortion of the medium at localization sites. This is satisfied by /DELTA/(T, t)?/DELTA/sub //0+(1-/alpha/)kT ln(t/sub t/au/) where /tau/ is the mean initial localization time of the carrier, 10/sup -13/ -10/sup -12/s, /DELTA/sub //0 is the height of the barrier at /tau/, and 0</alpha/<1. Consequently /nu/?/nu/sub //0(t/sub t/au/)/sup //alpha//sup -1/ exp(-/DELTA/sub //0/kT) which applies also to bimolecular recombination. 17 refs.

24068 **Imaging and analysis of surfaces using diffracted electrons.** Cowley, J.M. (Arizona State Univ., Tempe). pp 212-215 of 39th annual proceedings of the Electron Microscopy Society of America. Bailey, G.W. (ed.). Ithaca, NY; Electron Microscopy Society of America (1981). Contract AC02-76ER02995.

Using an STEM instrument, a technique was developed to combine imaging with a lateral resolution of at least 10 A for studying crystal surfaces. Observations made using this technique to study the surface of bulk MgO crystals and artificially grown diamonds which are covered with a thin amorphous layer and many small crystals of a Ni alloy are reported. Some other special techniques which yield information about microstructure of crystals but which require further development are mentioned. Guidance for the choice of specimen areas and for the interpretation of data when microanalysis from surfaces is attempted can result from correlation between imaging and microdiffraction. (BLM)

4003 Organic Chemistry

REFER ALSO TO CITATION(S) 22936, 24059, 24075

24069 **(LBL—15485) Studies of molecular adsorbates at interfaces by optical second-harmonic generation.** Tom, H.W.K.; Heinz, T.F.; Shen, Y.R. (Lawrence Berkeley Lab., CA (USA)). Dec 1982. Contract AC03-76SF00098. 26p. (CONF-830128—2). NTIS, PC A03/MF A01. Order Number DE83008395.

From International conference on photochemistry and photobiology; Alexandria, Egypt (5 Jan 1983).

Optical second-harmonic generation (SHG) is surface-specific and has the sensitivity to detect submonolayers of molecules. It can be applied to study molecular adsorbates at the interface between any two centrosymmetric media. This has been demonstrated by using dye and p-nitrobenzoic acid (PNBA) molecules adsorbed on smooth fused quartz substrates as examples. With resonant SHG, the $S_0 A \rightarrow S_2$ transition of the adsorbed dye molecules was measured. From the polarization dependence of the SHG, the orientation of PNBA at both the air/quartz and the ethanol/quartz interfaces was deduced. By varying the concentration of PNBA in ethanol, an adsorption isotherm for PNBA at the ethanol/quartz interfaces was also obtained.

24070 **(RFP-Trans—394) Novel diphosphonic and triphosphonic esters and their preparation and uses.** Sturtz, G.; Pensec, T.; Gautier, J.C.; Kohn, A. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Mar 1983. Contract AC04-76DP03533. Translation of European Patent Application, Publication No. 0 023 173 A1, 1980. 30p. NTIS, MF03/MF A01. Order Number DE83008675.

Portions are illegible in microfiche products.

This claim concerns a new group of di- and triphosphonic esters, especially dibasic esters of acids in which the two phosphorus atoms are bound by a hydrocarbon group. The claim also includes a manufacturing process for these novel compounds and their use in solvent extraction of uranium. Procedures are presented using these phosphoric esters. 2 tables.

24071 **Synthesis of alpha-amino acids.** Davis, J.W. (to Dept. Of Energy). US Patent 4,371,705. 1 Feb 1983. Filed date 29 Jun 1981. vp.

PAT-APPL-278104.

A method for synthesizing alpha amino acids proceeding through novel intermediates of the formulas: R_1R_2C(Osoc/sub 1/)C/sub n/, R_1R_2C(C/sub 1/)C/sub n/ and $(R_1R_2C$(C/sub n/)$O)_2SO$ wherein R_1 and R_2 are each selected from hydrogen monovalent substituted and unsubstituted hydrocarbon radicals of 1 to 12 carbon atoms. The use of these intermediates allows the synthesis steps to be exothermic and results in an overall synthesis method which is faster than the synthesis methods of the prior art.

24072 **Most general density-cubic equation of state: application to pure nonpolar fluids.** Kumar, K.H.; Starling, K.E. (Univ of Okla, Norman, USA). *Industrial and Engineering Chemistry Fundamentals;* **21**: No. 3, 255-262(Aug 1982).

Thermodynamic properties of pure nonpolar fluids are predicted accurately, over wide ranges of temperature and pressure conditions, by the most general density-cubic equation of state. Of particular merit is the accurate prediction of liquid densities and low-temperature vapor pressures. The development of the temperature dependence and the generalization of the equation of state using thermodynamic property data for normal paraffin hydrocarbons, methane through n-decane, are presented herein. The generalized equation of state predicts vapor pressure and vapor and liquid densities to within 1% (average) of the experimental values for these fluids. The equation of state prediction of thermodynamic properties of 32 fluids is compared with the predictions by a popular density-cubic equation namely, the Peng-Robinson equation and a popular BWR-type equation of state. According to these comparisons the most general density-cubic equation is superior to the Peng-Robinson equation and is on par with the BWR-type equation of state. 60 refs.

24073 **Small-angle neutron scattering studies of a compatible polymer blend, atactic polystyrene-poly(2,6 dimethyl phenylene oxide).** Wignall, G.D.; Child, H.R.; Li-Aravena, F. (Oak Ridge National Lab., TN). *Polymer;* **21**: 131-132(Feb 1980). Contract W-7405-ENG-26.

The results of small-angle neutron scattering investigation made on a polymer blend, polystyrene-polydimethyl phenylene oxide are reported. These results demonstrate that this system is compatible on a segmental level and that the chain dimensions are similar to those in the homopolymer. The dimensions of perdeutero polystyrene (DPS) in poly(dimethylphenylene oxide) (PPO) were found to be close to the dimenstjions of DPS in hydrogenous polystyrene. (BLM)

4004 Electrochemistry

REFER ALSO TO CITATION(S) 22937, 23899

24074 **Microwave absorption studies of interface phenomena at ZnO electrodes.** Bogomolni, R.A.; Tributsch, H.; Petermann, G.; Klein, M.P. (Laboratory of Chemical Biodynamics, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Journal of Chemical Physics;* **78**: No. 5, 2579-2584(1 Mar 1983).

In order to explore the feasibility of microwave absorption techniques as a tool for the study of interfaces and electrode reactions we have measured the electrochemical and photochemical properties of ZnO in contact with an aqueous electrolyte by conventional electrochemical procedures and simultaneously by electrodeless detection of microwave absorption at 9.5 GHz in a resonant cavity. Pronounced potential dependent microwave absorption signals were found which proved to be influenced by illumination and electrochemical surface reactions. The comparison of microwave absorption with the electrochemically measured electrode behavior indicates, that microwave absorption data can provide interesting complementary information on the nature and reactivity of charge carriers and dipoles in the electrode/electrolyte interface. The proposed method is so sensitive that signals arising from fractions of monolayers will be detectable. A comprehensive interpretation of the results is not yet attempted. Further experimental studies on simple electrode systems are needed to clarify the mechanism. Because of its nondestructive nature, the microwave method could develop into a valuable new technique in surface chemistry.

24075 **Electropolymerization of pyrrole in the presence of fluoborate.** Prejza, J.; Lundstrom, I.; Skotheim, T. (Linkoping Inst of Technol, Swed). *Journal of the Electrochemical Society;* **129**: No. 8, 1685-1689(Aug 1982).

The formation of polypyrrole on some metallic films (Pt,Pd,Ti,Au,Ni,Cr,In,Al,Fe,Ag, etc.) has been studied under potentiostatic and galvanostatic conditions. The role of pyrrole and the fluoborate ion in the polymerization process has been investigated at room temperature. From the analysis of galvanostatic current-potential curves it has been possible to distinguish the particular processes: initiator formation, polymerization, polymer degradation, and gas evolution. The polymerization in acetonitrile is indirectly initiated with a reaction order of /approximately equals/1 with respect to the BF/sub 4//sup -/ concentration. There are at least two different kinds of polypyrrole, depending on polymerization potential, that differ structurally. The formation of polymers on nonpolarized electrodes has also been observed. This work is pertinent to solar cells. 23 refs.

4005 Photochemistry

REFER ALSO TO CITATION(S) 23211, 23283, 24069, 24074

4006 Radiation Chemistry

24076 **(DOE/ER/03238—T1) Color-center production and lattice expansion in KBr by x-irradiation near room temperature.** Fuchs, W.; Wiegand, D.A. (Carnegie-Mellon Univ., Pittsburgh, PA (USA)). [nd]. Contract AC02-76ER03238. 33p. NTIS, PC A03/MF A01. Order Number DE83008232.

Portions are illegible in microfiche products.

Nominally pure single crystals of KBr were x-irradiated near room temperature and the integrated V band absorption was studied as a function of the integrated F and F-aggregate absorption. For this relationship several stages could be distinguished during the generation of defects suggesting that at least three different kinds of defects or disorders are responsible for the V-type absorption. The relationships of the V to F band absorption during growth and annealing suggest that the V-type centers are the complements of the trapped electron centers at least in the electronic sense. During thermal annealing the lattice expansion produced by irradiation decreases much slower than the optical absorption, and the x-ray diffraction lines broaden. Both of these results suggest a clustering of defects, and it is postulated that the point-like F-type centers are converted into clusters. With further thermal treatment the line broadenings disappear, and other measurements indicate that all detectable disorders is annealed out around 300°C. 8 figures, 1 table.

24077 **EPR study of a radical anion in x-ray irradiated trifluoroacetamide single crystals at 3 K.** Samskog, P.; Kispert, L.D. (Chemistry Department, The University of Alabama, Tuscaloosa, Alabama 35486). *Journal of Chemical Physics;* **78**: No. 5, 2129-2132(1 Mar 1983).

The radical anion $CF_3CONH_2^-$ was identified by EPR spectroscopy in a single crystal of trifluoroacetamide x-ray irradiated at 3 K. The primary radical gave anisotropic hyperfine couplings to a fluorine of 139, 78, and 63 G, with g values 2.0061, 2.0047, and 2.0029. The maximum fluorine coupling is directed close to one of the C—F bonds, indicating a delocalization of spin density into that bond. The radical anion decomposes thermally by defluorination, giving CF_2CONH_2. By bleaching the anion with visible light a CF_3 fragment is formed. A complete reaction mechanism both for the primary oxidation and reduction products consistent with the observed species is proposed.

4007 Radiochemistry And Nuclear Chemistry

REFER ALSO TO CITATION(S) 23109, 23123, 23170, 23578, 24001

24078 **(CONF-820773—1) Spectroscopic properties of the f-elements in compounds and solutions.** Carnall, W.T.; Beitz, J.V.; Crosswhite, H.; Rajnak, K.; Mann, J.B. (Argonne National Lab., IL (USA); Kalamazoo Coll., MI (USA). Dept. of Physics; Los Alamos National Lab., NM (USA)). 1982. Contract W-31-109-ENG-38. 72p. NTIS, PC A04/MF A01. Order Number DE83007963.

From NATO Advanced Study Institute conference on the systematics and the properties of the lanthanides; Braulage, F.R. Germany (11 Jul 1982).

In this systematic examination of some of the spectroscopic properties of the f-elements we deal with both the trivalent lanthanides and actinides. We summarize the present status of our energy level calculations in single crystal matrices and in aqueous solution, and compare the predicted crystal-field structure in certain low-symmetry sites with that observed. Some interesting new structural insights are thereby gained. The state eigenvectors from these calculations are then used in part in reassessing and interpreting the intensities of transitions in aqueous solution via the Judd-Ofelt theory. The parameters of this theory derived from fitting experimental data are compared with those computed from model considerations. Finally, we discuss some recent contributions to the interpretation of excited state relaxation processes in aqueous solution. 79 references, 23 figures, 17 tables.

24079 Quasiclassical trajectory (and variational transition state theory) study of the rates and temperature-dependent activation energies of the reactions Mu+H_2 (completely thermal) and H, D, and Mu+H_2 (v = 0, j = 2). Blais, N.C.; Truhlar, D.G.; Garrett, B.C. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* 78: No. 5, 2363-2367(1 Mar 1983).

We report forward and backward quasiclassical trajectory calculations of the rate constant for the reaction Mu+H_2→MuH+H at 444—2400 K. The accuracy of the calculations is assessed by comparison to variational transition state theory, both with and without tunneling contributions, and to experiment. We find the backward trajectory calculations are more accurate, as would be expected since the dynamical bottleneck occurs towards the products in the Mu+H_2 reaction. Both the reverse trajectory calculations and the variational transition state theory calculations including tunneling agree with the experimental rate constants within a factor of about 2, which is considered very good agreement. We also report trajectory calculations and variational transition state theory calculations for the temperature-dependent activation energy, which increases by about 4 kcal/mol over the temperature range studied. To aid in the interpretation of this temperature dependence and that found in previous studies for H+H_2 and D+H_2, we also report temperature-dependent activation energies for the three state-selected rate constants H(D,Mu)+H_2(v = 0, j = 2) →H_2(HD,HMu)+H.

24080 Synthesis and properties of uranyl monothiocarbamate alkoxides, an air-stable class of uranyl alkoxides. Perry, D.L. (Lawrence Berkeley Lab., CA). *Inorganica Chimica Acta;* 48: 117-124(1981). Contract W-7405-ENG-48.

Uranyl monothiocarbanate alkoxides, $[R_3NH_3]^+[UO_2(R_2NCOS)_2OR']^-$, (where R = CH_3, C_2H_5, and n-C_3H_7, and R′ = CH_3 and C_2H_5) have been synthesized and characterized. The compounds, all yellow crystalline solids which are soluble in acetonitrile, alcohol, and other organic solvents, represent a class of both air- and moisture-stable actinide alkoxides and mixed monothiocarbamate-alkoxide metal ion complexes. Infrared spectroscopy indicates the title compounds to be associated in the solid state. X-ray photoelectron data using the uranium-4f, oxygen-1s, sulfur-2p, and nitrogen-1s photoelectron lines are in excellent agreement with known structural data and yield binding energies for the uranium-4f/sub 7/2,5/2/ spin orbit doublet which are consistent with the hexavalent UO_2^{2+} species. The X-ray photoelectron data for the uranyl monothiocarbamate alkoxides are discussed with respect to possible canonical structures for the compounds, inductive charge effects involving the uranium-sulfur and uranium-oxygen bonds of the monothiocarbamate anion, and binding energies of sulfur and oxygen for other similar systems. 3 figures, 2 tables.

4008 Combustion, Pyrolysis, And High-temperature Chemistry

24081 (DOE/ER/10477—3) Infrared absorption spectroscopy with color-center lasers. Progress report, April 1 1982-February 15, 1983. Curl, R.F. (Rice Univ., Houston, TX (USA). Dept. of Chemistry). 1983. Contract AS05-79ER10477. 2p. NTIS, PC A02/MF A01. Order Number DE83007971.

In previous years, a color center laser spectrometer for the observation of the absorption spectra of small free radicals of importance in flames and discharges has been developed and several methods for increasing sensitivity explored. By combining magnetic rotation sensitivity enhancement with the long pathlengths obtainable with a multi-pass absorption cell very good sensitivity for free radicals (a detection limit of ~ 10^9/cc for OH) has been achieved. Using this arrangement, the lowest electronic transition of the free radical C_2H has been observed for the first time in a DC glow discharge in a mixture of Ar and acetylene inside the multipass cell and one band assigned and analyzed. During the current grant year, the vibrational assignment of the C_2H bands has been completed. The difficult problem of calculating the lineshapes of these magnetic rotation transitions has been solved allowing the accurate (0.001 cm^{-1}) determination of the linecenters. Rotational fitting has carried out, but is not yet in final form because of the presence of several perturbations which remain to be analyzed.

24082 (DOE/ER/10677—5) Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels. Progress report, February 16, 1982-February 15, 1983. Lester, T.W.; Merklin J.F.; Sorensen, C.M. (Kansas State Univ., Manhattan (USA)). Mar 1983. Contract AC02-80ER10677. 32p. NTIS, PC A03/MF A01. Order Number DE83009093.

Portions are illegible in microfiche products.

Effort this reporting period has been concentrated on the measurement of the diffusion constants of soot aerosols in both laminar premixed and diffusion flames and on preliminary analysis of the influence of the presence of cyclohexane on the decomposition of and soot formation from benzene. The diffusion coefficients of aerosol particles in the intermediate Knudsen number regime have been measured with the use of the dynamic light-scattering technique Photon Correlation Spectroscopy. The experimental values, obtained in flame generated aerosols as well as polystyrene microsphere aerosols, are compared to the diffusion coefficients theoretically predicted. It is found that these simple theories are in error by up to an order of magnitude, and over predict the diffusion constants for the aerosol particles in both the flame generated aerosols and the polystyrene microsphere aerosols. A speculative hypothesis is put forth that retains these theories as a limiting case for larger particles in this intermediate region. Concurrently with the light scattering studies in the flames, the pyrolysis of cyclohexane in a single pulse shock tube was investigated for reaction temperatures of 1400 to 2400 K and reaction pressures of 7 to 13 x 10^5 Pa. Additional studies were carried out for reactant systems of benzene and benzene/cyclohexane mixtures. Quantitative and qualitative analyses were performed for certain gaseous products of pyrolysis. Comparison of the gaseous yields of the cyclohexane, benzene, and benzene/cyclohexane mixtures indicates that the aliphatic and aromatic molecules decompose independently. Preliminary gravimetric results of the solid and liquid products reveal that the weight percent yield from the decomposition of mixtures of cyclohexane/benzene is greater over a temperature range of 1400 to 1700 K than from decomposition of either hydrocarbon by itself. 10 figures.

42 ENGINEERING

4202 Facilities And Equipment

REFER ALSO TO CITATION(S) 22973, 22974, 22975, 23021, 23028, 23400, 23513, 23544, 23545, 23607, 23682, 23777, 23779, 23780, 23803, 24029, 24191, 24192, 24726, 24985, 24986, 24988, 24989, 25006, 25009, 25010, 25011, 25012, 25013, 25014, 25015, 25016, 25017, 25018, 25019, 25020, 25022, 25023, 25024, 25025, 25026, 25027, 25028, 25029, 25032, 25033, 25035, 25036, 25039, 25040, 25042, 25044, 25045, 25046, 25048, 25049, 25051, 25052, 25053, 25054, 25055, 25056, 25057

24083 (AD-A—122093/8) Analytical and experimental investigations of sodium heat pipes and thermal energy storage systems. Final report oct 80-sep 81. Jacobson, D. (Arizona State Univ., Tempe (USA)). Jan 1982. 213p. NTIS, PC A10/MF A01.

Eight work elements for FY 1981 are reported on. A brief evaluation of the limits of arterial heat pipes is presented followed by the post life examination of two Inconel 600, sodium heat pipes which failed by pin hole corrosion through the evaporator. Nearly 12,000 hours of operation was sustained by one of the heat pipes prior to failure. A parametric test station for a thermal train including a 15-foot Inconel 617-sodium heat pipe is discussed. A secondary sodium heat pipe with integral LiF thermal energy storage capsules and a sodium thermal transfer joint is discussed. A series of fifteen 18-in. long by 0.5 in. diameter Inconel 617, sodium heat pipes are being prepared for parametric and life tests. A 12-in. long, 1-in. diameter Inconel 617 container filled with the thermal energy storage salt 64LiF-30 MgF^2-6KF was tested to determine latent heat of fusion (782 J/gm), melting point (710 C), freezing point (671 C) and diffusivity (0.00799 sq cm/sec) of the salt. The post life test results of a series of nine salt-Inconel 600 capsules, including LiF-MgF^2, LiF-MgF^2 -KF, and LiF-MgF^2 NaF are presented. A 321 stainless steel, sodium heat pipe containing three LiF thermal energy storage units has a total of over 10,700 hours of operation and 3426 cycles of life testing.

24084 **(ANL/NESC—750R) CURT2; curved tubes or elbows & attached pipes.** Gwaltney, R.C. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048750.

CURT2 will compute the stress distributions and displacements of generic points in a structure that consists of up to 5 arbitrarily arranged straight and curved cylindrical shells. The thickness of each part, the modulus of elasticity and Poisson's ratio for each part must be constant. Reference report, ORNL-TM-4646.

CURT2 is a computer code that calculates stresses and displacements in a shell structure made up of curved or straight cylindrical segments such as those in a piping system. Loadings considered are internal pressure and/or arbitrary end loadings that may be distributed symmetrically or nonsymmetrically around the circumference.IBM360,370; FORTRAN IV; OS/360; 450K bytes of storage are required.

24085 **(ANL/NESC—759) CORTES; thermal & mechanical analysis of tees.** Gantayat, A.N.; Powell, G.H. (California Univ., Berkeley (USA). Coll. of Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048759.

CORTES is a package consisting of five finite element programs developed for the stress analysis of ANSI B16.9 tee joints. The five programs are: SA, the stress analysis program which analyzes pipe joints for the effects of internal pressure and arbitrary combinations of bending moment, torsional moment, axial force, and sheer force on the ends of the branch and run pipes. A limited temperature stress analysis capability is provided. EP, the elastoplastic stress analysis program which analyzes pipe joints for the effects of internal pressure and arbitrary combinations of forces, including moments, and displacements, including rotations, imposed on the ends of the run and branch pipes. THFA, the transient heat flow analysis program which determines the time history of temperature variations in the pipe joints. Temperature changes are specified at the inner surface, and a heat flow analysis is performed assuming a perfectly insulated outer surface. SHFA, the steady-state heat flow analysis program which determines the steady-state temperature distribution in pipe joints. Temperatures are specified on given cross-sections of the branch and run portions of the tee joint, and the temperature distribution throughout the remainder of the joint is calculated assuming the inner and outer surfaces are perfectly insulated. TSA, accepts as input, the output data from THFA or SHFA and performs the thermal stress analysis on the pipe joints.IBM360,370; FORTRAN IV; OS/360; All five programs use card input and a line printer. Execution of the SA test problem required 960K bytes of memory and 12 scratch disk units. The TSA test case used 880K bytes of memory and 11 scratch disk units.

24086 **(ANL/NESC—760) GRFPAK; plot package for CORTES FEM programs.** Fowler, P.G.; Bryson, J.W. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048760.

Requests for plots relating to displacements are invalid for the CORTES programs TSA, THFA, and SHFA. The maximum value for the variable MTOT in the MAIN program is 22,000. Reference report *RECFM=VBS,BLKSIZE=3156.

GRFPAK is a graphics package written for the CORTES finite-element programs. It includes three plotting routines to assist in analyzing, interpreting, and presenting CORTES results. One plotting routine displays stresses or stress indices by means of contour curves drawn within either the outside or inside surface outline of a quarter section of the tee-joint. Using this routine, one can also obtain plots of the finite-element mesh as viewed from any point in space. A second plotting routine gives a stress versus distance plot along any specified line of nodes. A third routine displays cross-sectional views of the finite-element mesh for both the undeformed (original) and deformed configuration. The deformed configurations are drawn using an exaggerated scale specified by the user.IBM360,370; FORTRAN IV; OS/360; Card reader, tape unit, line printer, and CalComp plotting equipment are required. The amount of memory needed depends on the number of nodes and elements in the finite element idealization. The sample problem which consists of 675 elements required 290K bytes of memory.

24087 **(ANL/NESC—795) SHOCK; dynamic response of lumped-mass systems.** Gabrielson, V.K. (Sandia National Labs., Livermore, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048795.

Maxima of 100 masses, 200 springs or couplings. Complex arrangements of nonlinear options must be carefully checked by the user.

SHOCK calculates the dynamic response of a structure modeled as a spring-mass system having one or two degrees of freedom for each mass when subjected to specified environments. The code determines the behavior of each lumped mass (displacement, velocity, and acceleration for each degree of freedom) and the behavior of each spring or coupling (force, shear, moment, and displacement) as a function of time. Two types of models, axial, having one degree of freedom, and lateral, having two degrees of freedom at each mass can be processed. Damping can be included in all models and shock spectrums of responses can be obtained.CDC6600,7600; FORTRAN IV; SCOPE 3.4 or NOS/BE; 125,000 (octal) words of storage are used.

24088 **(ANL/NESC—798) MSF21;VTE21; desalination plant optimization.** Wilson, J.V. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048798.

The loss of tray brine temperature is the same for each stage in the heat recovery section and in the heat reject section. The temperature and the flow rate of the heat reject stream are always greater than zero, Reference reports, ORNL-TM-3535 Parts V and VI, ORNL/TM-5230 with Errata, NESC Note, and ORNL-TM-3535 Part III (2 microfiche).

MSF21 and VTE21 perform design and costing calculations for multistage flash evaporator (MSF) and multieffect vertical tube evaporator (VTE) desalination plants. An optimization capability is available, if desired. The MSF plant consists of a recovery section, reject section, brine heater, and associated buildings and equipment. Operating costs and direct and indirect capital costs for plant, buildings, site, and intakes are calculated. Computations are based on the first and last stages of each section and a typical middle recovery stage. As a result, the program runs rapidly but does not give stage by stage parameters. The VTE plant consists of vertical tube effects, multistage flash preheater, condenser, and brfine heater and associated buildings and equipment. Design computations are done for each vertical tube effect, but preheater computations are based on the first and last stages and a typical middle stage.IBM360,370; FORTRAN (97%) and BAL (3%); OS/360,370; MSF21,VTE21 requires 272K bytes of storage for execution. Standard system card-image input and printer output units are needed.

24089 **(ANL/NESC—809) TVENT; ventilation system transient analysis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Gregory, W.S. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048809.

Maxima of 500 branchesc 400 nodes, 60 rooms, 40 blowers, 20 boundary nodes, 5 time functions, 20 points per time function, 15 blower functions, 20 points per blower function, 10 frames, 4 plots per frame, 50 points per plot.

TVENT predicts flows and pressures in ventilation systems caused by pressure transients such as a tornado. A ventilation system model includes system elements (components such as filters, dampers, ducts, blowers) connected at nodal points to form networks. The program solves one-dimensional lumped parameter, incompressible flow equations augmented by fluid storage. The user

can identify points of excessive depressurization and areas of high flow.CDC7600;IBM360,370; FORTRAN IV; NOS, LTSS, and SCOPE (CDC7600), OS/360 (IBM360); 53,000 (octal) words of memory.

24090 **(ANL/NESC—810R) CREEP-PLAST2; 2-dimensional inelastic structural analysis.** Clinard, J.A. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048810.

Reference reports, ORNL/TM-5868, ORNL-TM-4642, ORNL-TM-4642 Supplement 2, and Note * RECFM=VBS, BLKSIZE-3520.

CREEP-PLAST2 is a special-purpose two-dimensional inelastic structural analysis program based on an incremental finite-element method. It is applicable to static and quasi-static loadings of plane structures (in-plane loadings, plane-stress conditions) and axisymmetric structures (axisymmetric loadings). The loadings can consist of combinations of applied forces, pressures, displacements, and/or temperatures. Cyclic as well as monotonic loadings can be treated, and loadings can be proportional or nonproportional. The structure can be composed of up to three different materials; each should be adequately represented by the thermoelastic-plastic-creep constitutive equation forms recommended for austenitic stainless steel in U.S. DOE RDT Standard F9-5T, (September 1974). Two postprocessor graphics programs use plot output files from CREEP-PLAST2 to display the time and/or mechanical load histories of nodal displacement, stress, strain, and temperature (HISTORY-PLOT) and contour lines of whole field deformations and stress, strain or temperature (CONTOUR-PLOT).IBM360,370; FORTRAN IV (95%) and BAL (5%); OS/360,370, Level 21.6/21.7; A minimum of 230K bytes of storage is required. Storage requirements may vary up to 1500K bytes for a non-overlay solution of larger problems. The program requires approximately 410K bytes of storage to execute the sample problems. Standard input and output units are needed. In addition, the KBSAM utility routines could require up to 5 direct-access storage units for scratch storage, and as many as 5 additional sequential files on peripheral units depending on user-selected program options. The plotting programs HISTORY-PLOT and CONTOUR-PLOT each execute in less than 170K bytes of storage.

24091 **(ANL/NESC—813) GLOVE CHANGE ANALYSIS SYSTEM; glove data base.** Sanders, J.W. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048813.

The GLOVE CHANGE ANALYSIS SYSTEM was developed in support of an overall Glove Quality Program administered by the Rocky Flats Quality Engineering and Control organization. No controls are included on glove inventory or issues from stock, nor does the system provide validation of glove type correctness for various kinds of service.

The system uses the Glovebox Glove Data Base for analysis of the frequency, nature, and probable cause of glovebox glove failures, and for tracking and scheduling routine preventive-maintenance changes. The system provides edits of weekly data input, monthly summary of change activity and gloves scheduled to be changed, plus a maintenance-type program to annually remove old data from the active files. File retrieval language is then used to perform non-routine statistical analyses on any combination of data elements.IBM360; COBOL with TOTAL DBMS (95%) and Assembler (5%); OS/360 HASP with CAPEX optimizer.

24092 **(ANL/NESC—828) SWAP9; stress-wave analysis in 1-dimensional strain.** Barker, L.M.; Young, E.G. (Sandia National Labs., Albuquerque, NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048828.

A maximum of 25 different materials is allowed with up to 50 constants for each material. The maximum number of lines active on the x,t plane at any given time is 300. Reference reports, SLA-74-0009 and Appendices F, G, and H from SC-DR-68-885.

SWAP9 is a computer program for solving stress-wave problems in one-dimensional strain. It handles both hydrostatic and elastic-plastic materials, can incorporate such effects as work hardening, changes in elastic constants, and yield strength with pressure and internal energy, and spall at a given tensile stress. SWAP9 can also treat detonations, gases, and vaporization of solids resulting from radiant energy deposition.CDC6600,7600; FORTRAN IV; SCOPE; 110,000 (octal) words of memory are required on the CDC7600.

24093 **(ANL/NESC—831) RO75; reverse osmosis desalting plant design.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Wilson, J.V. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048831.

The program does not optimize or design the membrane properties and the internal structure and flow characteristics of the membrane modules; it assumes operating characteristics defined by the membrane manufacturers. Reference report, ORNL/TM-5229.

RO75 is a program for the optimization of the design and economics of one- or two-stage seawater reverse osmosis plants.IBM360,370,303x; FORTRAN IV (92%) and Assembly language (8%); OS/360; 150K bytes of memory are needed for execution.

24094 **(ANL/NESC—846) PROMSYS; programmed equipment maintenance.** Morgan, D.L. (Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048846.

PROMSYS is a computer system designed to automate the scheduling of routine maintenance and inspection of plant equipment. This 'programmed maintenance' provides the detailed planning and accomplishment of lubrication, inspection, and similar repetitive maintenance activities which can be scheduled at specified predetermined intervals throughout the year. The equipment items included are the typical pumps, blowers, motors, compressors, automotive equipment, refrigeration units, filtering systems, machine shop equipment, cranes, elevators, motor-generator sets, and electrical switchgear found throughout industry, as well as cell ventilation, shielding, containment, and material handling equipment unique to nuclear research and development facilities. Four related programs are used to produce sorted schedule lists, delinquent work lists, and optional master lists. Five additional programs are used to create and maintain records of all scheduled and unscheduled maintenance history.IBM370; ANS COBOL (97%) and Assembly language (3%); OS/360; 200K bytes of memory are required for execution.

24095 **(ANL/NESC—950) ADVCON; advance control 93 APT postprocessor.** O'Hare, G.A. (Bendix Corp., Kansas City, MO (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048950.

ADVCON is a numerical control postprocessor to support the Advance Control 93 R/D CNC routing/drilling machine. The postprocessor converts APT CL tape information produced by the APT processor into machine tool instructions so that the machine control unit can place a tool on a part to develop the desired geometric configuration. The postprocessor is concerned with machine tool geometry and dynamics as well as the control unit options and input characteristics. ADVCON produces punched cards or mylar tape containing the coded instructions to accomplish the desired result, i.e., movement of the machine tool.CDC CYBER174,175; FORTRAN IV; SCOPE 3.3; 54,000 (octal) words of memory are required for ADVCON, including section 0 and section 4 of APT..

24098 **(ANL/NESC—951) PTTOPT; point-to-point tool APT postprocessor.** O'Hare, G.A. (Bendix Corp., Kansas City, MO (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048951.

PTTOPT is a numerical control postprocessor to support a number of point-to-point machine tools and their associated machine control units: Wiedeman N/C Turret Punch Press, Knight Model 65 Jig Borer, Burgmaster 2BHT Drill with Ferranti Control, Burgmaster 2BHT Drill with G.E. Control, Burgmaster 2BHT Drill with Pratt and Whitney Control, Burgmaster 3BHT Drill with G.E. Control, CSIP 3K Jig Borer with Sperry Control, and Moore Model 3 Jig Bore with Bendix Dynapath Control. This program converts APT processor output into machine tool language so that the machine control unit can develop a desired geometric configuration of a part. The postprocessor deals with machine tool geometry and dynamics as well as the control unit options and input characteristics. PTTOPT produces punched cards or mylar tape containing the coded instructions to accomplish the desired result, i.e., movement of the machine tool.CDC CYBER174,175; FORTRAN IV; SCOPE 3.3; 34,000 (octal) words of memory are required..

24097 **(ANL/NESC—952) BXAMER; hustler two-axis lathe APT postprocessor.** O'Hare, G.A. (Bendix Corp., Kansas City, MO (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048952.

Only the machine x-z plane is currently available for circular interpolation. From the part programmer's viewpoint, the only restriction is that the tool be perpendicular to the plane of the circle.

BXAMER is a numerical control postprocessor to support an American 2010 Hustler, dual turret, 2-axis lathe with a General Automation control. The postprocessor converts information from the APT processor into machine tool instructions so that the machine control unit can place a tool on a part to develop the desired geometric configuration. The postprocessor is concerned with machine tool geometry and dynamics as well as the control unit options and input characteristics. The APT CL tape serves as input to the postprocessor. Output from the postprocessor is standard BCD punched cards or a punched mylar tape. Also included as output is a listing of the N/C machine used, delta distances, and the machine coordinate positions generated by the postprocessor.CDC CYBER174,175; FORTRAN IV (greater than 99%) and COMPASS (less than 1%); SCOPE 3.3; 41,000 (octal) words of memory are required..

24096 **(ANL/NESC—953) OKUMA; OKUMA two-axis lathe APT postprocessor.** O'Hare, G.A. (Bendix Corp., Kansas City, MO (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048953.

Only the machine x-z plane is currently available for circular interpolation. From the part programmer's viewpoint, the only restriction is that the tool be perpendicular to the plane of the circle.

OKUMA is a numerical control postprocessor to support the OKUMA LH50-N dual vertical turret, 2-axis CNC lathe with either an OSP2200L or OSP3000L control unit. The postprocessor converts information from the APT processor into machine tool instructions so that the machine control unit can place a tool on a part to develop a desired geometric configuration. The postprocessor deals with machine tool geometry and dynamics as well as the control unit options and input characteristics. The APT CL tape serves as input to the postprocessor. Output from the postprocessor is standard BCD punched cards or a punched mylar tape. Also included as output is a listing of the N/C machine used, delta distances, and the machine coordinate positions generated by the postprocessor.CDC CYBER174,175; FORTRAN IV (greater than 99%) and COMPASS (less than 1%); SCOPE 3.3; 37,000 (octal) words of memory are required..

24099 **(ANL/NESC—980) BENDPAC; stress analysis of flanged pipe bends.** Whatham, J.F. (Australian Atomic Energy Commission, Sutherland). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048980.

Wall thickness should not exceed 0.3 of the pipe radius. All variables are expressed as truncated trigonometric series with a maximum of 16 terms.

BENDPAC is a package of seven programs designed to calculate the following: (a) stresses and deflections in pipe bends terminated by flanges, infinitely long tangent pipes, or short equal length flange-ended tangents when under pressure (PRESEF) or pure in-plane bending (BENDEF); (b) stresses in flange-ended pipe bends from in-plane end loading other than pure bending (SHEREF), coil spring type out-of-plane loading (COILEF), or any other type of out-of-plane loading (TURNEF); and (c) flexibility matrices for flange-ended pipe bends for any in-plane end loading (FLEXIN) or out-of-plane end loading (FLEXOT).IBM303x,370; FORTRAN IV (93%) and Assembly language (7%); OS/MVS and OS/MVT; 380K bytes of memory are required to compile and execute the programs..

24100 **(ANL/NESC—995) CLAP; linear control system design analysis.** Maddux, A.S. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048995.

The floating point accuracy of the computer limits the order of the transfer function polynomials to 15.

CLAP is a system of programs developed as a tool for the engineer to use in the design and analysis of linear controls for electronic or mechanical systems. Programs are included to calculate and plot system response time and gain and phase versus frequency, to calculate the roots of Nth-order polynomials, and to generate root locus plots as a function of loop gain. Bandwidth limitations, overshoot, ringing and other instabilities can be observed and corrected. Data files can be modified and merged. Characteristics and parameters of a system can be analyzed, then modified with a computer model of a compensator "installed" in the feedback loop.Commodore PET with IEEE 488 Bus interface and peripherals; BASIC; Commodore PET 2001-32N, IEEE 488 Bus, digitizing joy stick, Watanabe WX4671 Plotter, CBM 2040 Floppy Disk and 2022 Printer, and ECX Computer MX-200 modem..

24101 **(BDX—613-2912) Cable-positioning fixtures. Final report.** Galbraith, J.F. (Bendix Corp., Kansas City, MO (USA)). Mar 1983. Contract AC04-76DP00613. 12p. NTIS, PC A02/MF A01. Order Number DE83009148.

Three general-use tools were produced and evaluated for positioning cables during the encapsulation process. The tools are used for cables that have round connectors and potting shells. these tools will provide efficient cable loading and connector keyway orientation.

24102 **(CONF-811051—4) Control of energy transfer with an inductor-convertor bridge.** Kustom, R.L.; Ehsani, M.; Fuja, R. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83008672.

From US-Japan superconductive magnetic energy storage workshop; Madison, WI, USA (19 Oct 1981).

The theory of active control and the implementation techniques on an ICB network have been successfully demonstrated. In all likelihood, the bang-bang control technique will be the optimal system, since the current in the load coil requires a relatively long time to change. Any practical system, such as fusion reactors or accelerators, employing the large coils will have to maintain stability of operation under these conditions. Clearly, if the variations in the reference signal are within the parameter field, the ICB network can lock-on and stay within control as was demonstrated by the tests with a low frequency variation of the reference signal.

24103 **(CONF-820609—81) Role of mockup testing in the Hot Fuel Examination Facility remote operations.** McClurkin, J.L. (Argonne National Lab., Idaho Falls, ID (USA)). 1982. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83008748.

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

The Hot Fuel Examination Facility (HFEF) is one of the most-advanced hot-cell facilities in the world. The remote handling and examination equipment are state-of-the-art, totally remotely operated and maintained. Out-of-cell mockup and qualification testing of equipment has proven to be a successful method to ensure the workability of all remote-handling features of the in-cell equipment.

24104 **(CONF-820901—9) Friction factor correlation for the offset strip-fin matrix.** Webb, R.L.; Joshi, H.M. (Pennsylvania State Univ., University Park (USA). Dept. of Mechanical Engineering). 1982. Contract AC02-79ER10394. 7p. NTIS, PC A02/MF A01. Order Number DE83008630.

From 7. international heat transfer conference; Munich, F.R. Germany (6 Sep 1982).

This work deals with the offset strip fin surface geometry used in parallel plate fin compact heat exchangers. Previous attempts to correlate existing data have been impaired by the possibility that burrs may exist on the leading and trailing edges of the fins. Such burrs are believed to affect the heat transfer and friction characteristics. Patankar and Prakash have numerically predicted the heat transfer and friction characteristics of one geometry, but were unable to validate their results because of lack of accurate data on the geometry modeled. The experimental objective of this work was to obtain friction data on scaled-up matrix geometries that had precisely known dimensions, and no burred fin-edges. Data were taken on eight surface geometries that span a wide range of geometric parameters. These data were correlated within +- 10% to provide a generalized equation for the friction factor as a function of the geometric parameters and Reynolds number. The resulting correlation predicts actual heat exchanger friction data with good accuracy. This work further suggests that the effect of burrs on the published data for actual heat exchanger geometries is insignificant.

24105 **(DOE/ER/10394—2) Prediction of the friction factor for the offset strip-fin matrix.** Webb, R.L.; Joshi, H.M. (Pennsylvania State Univ., University Park (USA). Dept. of Mechanical Engineering). 1983. Contract AC02-79ER10394. 9p. (CONF-830301—10). NTIS, PC A02/MF A01. Order Number DE83008631.

From ASME-JSME thermal engineering joint conference; Honolulu, HI, USA (20 Mar 1983).

This work presents an analytical model and a semi-empirical correlation to predict the friction factor in the offset strip-fin matrix. Previously reported data on eight test sections were used to test the model and to develop the correlation. The analytical model assumes laminar flow and is based on a numerical solution for zero-thickness fins. It predicts 90% of the data below a Reynolds number of 2000 within +-10%. At higher Reynolds numbers the predicted values show increasing error because of vortex shedding in the wake, which is not accounted for by the laminar model. A semi-empirical correlation is developed that predicts 93% of the data within -10% in the range $300 < Re < 3600$.

24106 **(DOE/ER/10645—10-Pt.1) General framework for the assessment of dynamic resilience. Part I. Theory.** Morari, M. (Wisconsin Univ., Madison (USA). Dept. of Chemical Engineering). Feb 1982. Contract AC02-80ER10645. 19p. (CONF-821106—30-Pt.1). NTIS MF A01. Order Number DE83007109.

From Annual meeting of heat transfer and energy conversion (American Inst of Chemical Engineers); Los Angeles, CA, USA (14 Nov 1982).

Microfiche only, copy does not permit paper copy reproduction.

With increased process integration it has become very important to evaluate and compare the dynamic operability characteristics (dynamic resilience) of alternate designs. Based on recent results in multivariable frequency response theory a new framework is developed for this purpose. It is shown that dynamic resilience is determined by characteristics inherent in the system and that it is independent of the imposed controller structure and type. This gives the new method considerable intuitive appeal and allows it to avoid the lengthy optimization procedures which are typical for the previously published techniques.

24107 **(DOE/NBM—3008444) Engineering approaches to the development of hydraulic transport.** Miscoe, A.J.; Wang, R.C. (USDOE Pittsburgh Energy Technology Center, PA). 1978. 25p. NTIS, PC A02/MF A01. Order Number DE83008444.

The combination of empirical and developmental techniques must be carefully chosen to isolate the parameters of hydraulic transport of granular solids under study without ignoring the effect of other parameters. These other parameters must be controlled as carefully as possible. Simplifying assumptions must be chosen carefully to avoid assuming the problem away. In the interest of obtaining simple, easy to handle equations, most investigators to date have been myopic in the set-up of tests and in their analytical approach. The result is that the equations produced are really only valid under the conditions used, which may not have been adequately defined. It is doubtful that we have today the capability to completely analyze all the variables affecting the hydraulic transport of granular solids having a wide particle-size distribution. Even for the single phase transport of water, there are unknowns affecting the flow. But fluid mechanics investigators have been so successful at controlling their studies that efficient and economical water transport systems can be designed for a wide range of requirements. If similar results can be achieved in the design of two-phase hydraulic transport systems, hydrotransport will become a common mode of materials handling.

24108 (Juel-Conf—42(Vol.2), pp 917-943) **HAW-containers as a barrier in final storage.** Smailos, E.; Kienzler, B.; Koester, R. Jun 1981. (In German). NTIS (US Sales Only), PC A21/MF A01. Order Number DE82905800.

From International seminar on chemistry and process engineering for high-level waste solidification; Julich, F.R. Germany (1 Jun 1981).

Due to the design of the HAW-packing as barrier in the ultimate storage with a service life of some 10^4 years, a considerable decrease of the activity released into the biosphere during an accident can be achieved. The results obtained so far show that with hastelloy C4 and Al_2O_3 materials with high corrosion resistance are available. (Comprehensive tables).

24109 **(PB—83-120147) Development of a dc current limiting interrupting system for mines. Open file report Jun 79-Sep 81.** Hamilton, H.B. (Pittsburgh Univ., PA (USA)). Jan 1982. 105p. NTIS, PC A06/MF A01.

A switching system for high fault current, 300- and 600-volt dc trolley and haulage systems, as used in the mining industry are presented. The system consists of paralleled main and auxiliary contactor circuits with a liquid metal current limiting device (CLD) in series with the auxiliary contactor. Upon detection of a fault, the current is commutated into the CLD circuit. The liquid metal vaporizes, increasing the CLD resistance and considerably decreasing the actucal current to be interrupted. This system will materially reduce the wear and tear on contactors because of the reduced interrupting requirement. The CLD is pressurized; when the current is interrupted liquid metal flows back into the bore, thus it is resetting. Electrical and mechanical design principles, that were found satisfactory in field tests, are presented as well as materials for use.

24110 **(PNL-SA—9530-Pt.1) Investigation of combined heat and mass transfer from a wet heat exchanger. Part 1. Formulation of an approximate heat/mass transfer model for calculating the performance of heat exchangers in dry/wet operation.** Kreid, D.K.; Hauser, S.G.; Johnson, B.M. (Pacific Northwest Lab., Richland, WA (USA)). Aug 1982. Contract AC06-76RL01830. 57p. (CONF-830301—9-Pt.1). NTIS, PC A04/MF A01. Order Number DE83007702.

From ASME-JSME thermal engineering joint conference; Honolulu, HI, USA (20 Mar 1983).

An approximate analytical model is described that may be used to calculate the rates of heat transfer and evaporation from the

surface of a wet finned heat exchanger. The model is analogous to the conventional expression for convective heat transfer. However, the driving potential is an enthalpy difference instead of a temperature difference. The overall heat transfer coefficient can be computed in the usual manner using a simple transformation of variables. The value of the model is that wet heat exchanger performance can be estimated accurately using dry performance data.

24111 **(SAND—79-2291) Study and full-scale test of a high-velocity grade-crossing simulated accident of a locomotive and a nuclear-spent-fuel shipping cask.** Huerta, M.; Yoshimura, H.R. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 66p. NTIS, PC A04/MF A01. Order Number DE83008976.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report described structural analyses of a high-speed impact between a locomotive and a tractor-trailer system carrying a nuclear-spent-fuel shipping cask. The analyses included both mathematical and physical scale-modeling of the system. The report then describes the full-scale test conducted as part of the program. The system response is described in detail, and a comparison is made between the analyses and the actual hardware response as observed in the full-scale test. 34 figures.

24112 **(SAND—81-1295) Grayloc seal static tests.** Leisher, W.B.; Biffle, J.H. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 222p. NTIS MF A01. Order Number DE83009391.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted.

A series of evaluation tests was performed on Grayloc seals. Helium service and standard seals, size 292, were used. Measurements were made of axial force and motion, diameter, hoop and axial strain, and helium leak rate. Leak rates were in the 10^{-6} atm cc/s range for the helium service seals. Pretest analytical calculations agreed reasonably well with measured makeup forces and deflections.

24113 **(SAND—82-0852) Sewage Solids Irradiator Transportation System (SSITS) cask: preliminary design description.** Eakes, R.G.; Kempka, S.N.; Lamoreaux, G.H.; Sutherland, S.H. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 121p. NTIS, PC A06/MF A01. Order Number DE83009146.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The preliminary design of the Sewage Solids Irradiator Transportation System (SSITS) Cask is presented in this document. The SSITS cask is to be used for the transport of radioactive cesium chloride and strontium fluoride capsules which are of use in irradiators or as heat sources. The SSITS cask is approximately 1.4 m in diameter, 1.3 m high, weighs roughly 9 t, provides 33 cm of steel shielding, and can dissipate up to 5.2 kW of decay heat. The cask design criteria are identified and a description of the cask design and operation is provided. Detailed analyses of the design were performed to demonstrate licensability of the cask by the Nuclear Regulatory Commission (NRC). Results of the analyses indicate that the preliminary design is in compliance with the pertinent regulatory requirements for licensing of a radioactive material transportation container.

24114 **(UCRL—53377) Design and testing of the TX-4 Type A container for packaging radioactive waste.** Roberts, R.S.; Perkins, C.L. (Lawrence Livermore National Lab., CA (USA)). 4 Mar 1983. Contract W-7405-ENG-48. 23p. NTIS, PC A02/MF A01. Order Number DE83009212.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Toxic Waste Control Group at the Lawrence Livermore National Laboratory has designed and tested the TX-4, a Type A steel container for shipping and storing radioactive waste. We designed the TX-4 to eliminate the safety, maneuverability, weight, and cost problems experienced by other hazards waste containers. Our design meets the test criteria set by the Department of Transportation (49 CFR 173.398). The TX-4 container passed all tests when loaded to 7000 lb gross weight and effectively solved the above problems. Its simplicity of design, low weight, and ease in handling have proved to be timesaving and cost-effective. This report summarizes our testing of the TX-4 and past and present radioactive waste containers used by defense-related operations. Based on our results, we believe the TX-4 is a superior container for the hazardous waste industry. 10 figures, 1 table.

24115 **Heat pipe development for high temperature recuperator application.** Merrigan, M.; Dunwoody, W.; Lundberg, L. (Los Alamos Natl Lab, NM, USA). *Journal of Heat Recovery Systems;* **2**: No. 2, 125-135(1982).

Heat pipes have been developed for operation in oxidizing atmospheres at temperatures above 1100 K. The heat pipes comprise a metallic liner and wick structure with a protective outer shell of an oxidation resistant material. The working fluids used in the heat pipes are alkali metals. A number of configurations have been evaluated, ranging from pipes using a metallic inner liner of a chemically vapor deposited (CVD) refractory metal applied to ceramic tubing, to one utilizing ferrous materials with an outer layer of a developed oxide. The use of iron-chromium-aluminium alloys as container materials for operating in high temperature oxidizing and sulfiding gas streams has been investigated. 11 refs.

24116 **International Conference on Magnet Technology, 7th, MT-7, 1981.** Komarek, P.; Maurer, W.; Seibt, E.W. (eds.). (Kernforschungszent, Inst fuer Tech Phys, Karlsruhe, Ger). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **MAG-17**: No. 5, 1521-2384(Sep 1981).

Proceedings includes 191 papers dealing with a wide variety of magnet and supermagnet technology and materials. Topics considered include: nuclear reactors, high-energy physics, accelerators, conductors, solenoids, fusion magnets, irradiation effects, cryogenics, hybrid magnets, quench problems, energy storage, pulsed magnets, superconducting machines, test and laboratory magnets, losses, stability, field measurements, magnetic shielding, MHD, rotating machines, test facilities, research laboratories, structural materials, magnets for medical applications, biological effects, tokamak devices, particle spectrometers, superconducting cables and coils, magnetic levitation, plasmas, cryostats, magnetic separation, magnetic measurements and measuring instruments, and various alloys used for superconducting materials, particularly those containing niobium, tin, copper and titanium. All papers are abstracted separately. Technical and professional papers from this conference are indexed with the conference code no. 00687 in the Ei Engineering Meetings (TM) database produced by Engineering Information, Inc.

24117 **Design of epoxy-free superconducting dipole magnets and performance in both helium I and pressurized helium II.** Taylor, C.; Althaus, R.; Caspi, S.; Gilbert, W.; Hassenzahl, W.; Meuser, R.; Rechen, J.; Warren, R. (Lawrence Berkeley Lab, CA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **MAG-17**: No. 5, 1571-1574(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

Three model superconducting dipole magnets 1 m long, without iron, having a bore diam of 76 mm have been built without epoxy resins or other adhesives and tested in He I and He II. The conductor is the 23-strand Rutherford-type cable used in the Fermilab Doubler Saver magnets, and is insulated with Mylar and Kapton. The two-layer winding is highly compressed by a system of structural support rings and tapered collets. Little "training" was required to reach quench currents greater than 95% of "short sample" in Helium I. The maximum quench current in He II is increased 20 to 30%, compared with He I operation at 4.4 K. Test results are given on cyclic losses, heater-induced quenches, and charge-rate effects. 8 refs.

24118 **Current densities of commercial NbTi-based alloys for high field applications.** Segal, H.R.; Stekly, Z.J.J.; de Winter, T.A. (Magn Corp of Am, Waltham, MA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 1645-1648(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The critical current densities at high fields of 8 NbTi-based alloys are presented. Of these alloys, five contained tantalum in amounts varying from 0.5% to 25%. The processing of the samples was optimized for high field reduced temperature operation. All alloys were shown to have useful current densities for fields up to 12 tesla at temperatures lower than 3 K. The alloys with large amounts of tantalum had significantly higher current densities than did the binary alloys at the high fields. 5 refs.

24119 **General Dynamics superconducting magnet for the Large Coil Program: a progress report.** Hackley, D.S. (Gen Dyn, San Diego, CA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 1730-1733(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The General Dynamics magnet for the Large Coil Program (LCP) has progressed to the fabrication phase. All superconductor and structural details have been completed along with the bobbin, which has been insulated for winding. Outer ring and torque box subassemblies are being welded and readied for coil closeout.

24120 **Safety studies of cryostable superconductor.** Wang, S.T.; Huang, Y.C. (Argonne Natl Lab, IL, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 1761-1763(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

Superconductors used in a large superconducting magnet system are generally designed to be cryostable. There exists a strong possibility that cryostable conductor will burn out in a helium gas environment should a normal zone be generated from any point of the coil above the liquid helium level. An experiment was set up to investigate the heating of a cryostable conductor in a helium gas environment. Results are presented and the ultimate safety of a cryostable conductor is discussed.

24121 **Modeling the cooldown of force cooled coils.** Green, M.A.; Krafft, G.; Mitina, S. (Lawrence Berkeley Lab, CA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 1764-1767(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

A finite difference computer program which simulates the cooldown of force-cooled superconducting coils is outlined. The basic theory is discussed and the method of calculation used in the program is described. Some of the problems associated with computer modeling of a cooldown are discussed. The program capability is demonstrated on a three dimensional model which represents the 1000 kg cryogenic model of the Euratom LCT coil. From computer simulation using the program, a method for cooling down large forced cooled superconducting coils can be developed. 7 refs.

24122 **Quench protection and design of large high current density superconducting magnets.** Green, M.A. (Lawrence Berkeley Lab, CA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 1793-1798(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The problems associated with large high current density superconducting magnets fall into three categories; (a) quench protection, (b) stress and training, and (c) cryogenic design. The three categories must be considered simultaneously. The paper discusses quench protection and its implication for magnets of large stored energies. Training and its relationship to quench protection and magnetic strain are discussed. Examples of magnets, built at the Lawrence Berkeley Laboratory and elsewhere using the design guidelines given in this report, are presented. 26 refs.

24123 **Measurement and theoretical calculation of quench velocities within large fully epoxy impregnated superconducting coils.** Eberhard, P.H.; Gibson, G.H.; Green, M.A.; Grossman, E.; Ross, R.R.; Taylor, J.D. (Lawrence Berkeley Lab, CA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 1803-1806(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The velocity of normal region propagation was measured in a 2-m diameter superconducting coil. The measured data made with small sense coils did not agree with theories which have been used for the last 15 years. An adiabatic quench propagation theory, which takes into account the properties of both the superconductor and the matrix material and which assumes there is no heat transfer out of the wire, was found to agree with the experimental measurements. Both the theory and experimental measurements are given. 12 refs.

24124 **Transient cooling in internally cooled, cabled superconductors (ICCS).** Shanfield, S.R.; Agatsuma, K.; Montgomery, A.G.; Hoenig, M.O. (MIT, Cambridge, MA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 2019-2023(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

Rapid heat transfer is reported in transiently heated copper capillaries containing stagnant supercritical helium. The hydraulic diameter and metal-to-liquid ratio of these capillaries are similar to typical ICCS characteristics and simulate ICCS heat transfer behavior. The characteristic cooling time of capillaries was found experimentally to be simply related to the heated length and speed of sound in helium. The ICCS stability margin could be estimated from the measured fluid temperature in the heated zone once equilibrium temperatures had been re-established. These experimental results can be predicted by a computer code. The code also predicts ICCS stability margins by accounting for induced helium flow. The correlation of experiment and theory seemingly supports the hypothesis that locally induced helium flow is responsible for unexpectedly high ICCS recovery characteristics. 7 refs.

24125 **Design and testing of a dual 8-T 380-mm/12-T 220-mm split superconducting solenoid for ORNL.** Ballou, J.K.; Brown, R.L.; Fietz, W.A.; Forseman, J.W.; Gray, W.H.; Kenney, W.J.; Wysor, R.B.; Markiewicz, W.D.; van Alstyne, R.G. (Oak Ridge Natl Lab, TN, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 2238-2241(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

A superconducting high field magnet facility has recently been prepared for operation at the Oak Ridge National Laboratory (ORNL). The facility consists of a background NbTi coil and an insert coil made of Nb_3Sn tape. The background coil produces an 8-T central field, with a peak field of 8.8 T, in a bore of 380 mm and contains radial access ports of 67-mm diam. The insert in conjunction with the background coil produces a central field of 12 T, with a peak field of 13.5 T, and provides radial access ports of 67-mm diam. Details of magnet design both for the background coil and insert coil are presented. The protection scheme is discussed and test results are given. 5 refs.

24126 **Design, construction, and test of a 113-mm bore solenoid with NbTi cable-in-conduit superconducting windings.** Miller, J.R.; Lue, J.W.; Brown, R.L.; Kenney, W.J. (Oak Ridge Natl Lab, TN, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* MAG-17: No. 5, 2250-2253(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The authors constructed a solenoid using a cable-in-conduit type conductor with NbTi composite and copper strands as a focus for practical conductor fabrication techniques and coil winding methods using such conductors. The finished coil provides the opportunity for global tests of the performance of this type of conductor in a real coil that produces high fields and uses a long section of conductor. The cable is a concentric, containing 19 triplex strands made from 0.7-mm-diam wire. The superconducting strands are contained entirely within the outer layer of the cable and thus are fully transposed. The cable is jacketed with stainless steel tubing; the overall conductor diam is 8.6 mm. Induction heaters, voltage taps, pressure taps, and temperature sensors are installed in the windings to aid in stability measurements. Flow to the coil is provided by a blowdown system or a piston pump. Details of conductor and coil fabrication are presented. 5 refs.

24127 **Thermal expansion of several materials for superconducting magnets.** Clark, A.F.; Fujii, G.; Ranney, M.A. (NBS, Boulder, CO, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **MAG-17**: No. 5, 2316-2319(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The thermal expansion of several materials used in the consruction of high field superconducting magnets has been measured from 4 K to room temperature. The materials were a NbTi and two A15 multifilamentary conductors and several nonmetallic composites made from linen/phenolic, fiberglass/epoxy and superconducitng wire/epoxy. The conductor expansions are typical of metals and the composite expansions are highy anisotropic. Both graphic and tabular values are provided by a computer fitting of the experimental data. The importnce of thermal expansion differences in critical current measurement apparatus and superconducting magnet design are discussed. 12 refs.

24128 **Workshop on superconducting for magnets: frontiers of technology.** Braginski, A.I.; Freyhardt, H.C.; Fluekiger, R.; Hillmann, H.; Larbalestier, D.L.; Suenaga, M.; Wilson, M.N. (Westinghouse Electr Corp, Pittsburgh, PA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **MAG-17**: No. 5, 2343-2354(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The purpose of this Workshop was to discuss and prognosticate the future of superconducting composites for magnet applications. Prospects for higher operating fields and currents, higher thermal margins, stability, improved mechanical properties and cost were emphasized. User requirements were formulated and basic limits to the desired performance, as imposed by the physics and metallurgy of superconductors, were defined. Following superconductors were reviewed Nb-Ti and Laves phases, Nb_3Sn and V_3Ga, other A15's, B1's, and Chevrel phases. Technological and economic limitations of conventional manufacturing methods were defined and possibilities of new processing approaches assessed. 61 refs.

24129 **Stability of an aluminum-NbTi composite conductor at reduced temperatures.** Van Sciver, S.W.; Khalil, A. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1326-1329(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Stability studies of a subcomponent conductor for Superconducting Magnetic Energy Storage are reported. Experimental measurements on a wedge, 1/6th of a model conductor, show good current sharing and recovery. Tests at 4.2K give recovery currents above the critical current for fields in excess of 3 T. Similar results are predicted in superfluid He II at 2.0 K. Performance characteristics of a subcooled superfluid He II test facility are also discussed.

24130 **(RFP-Trans—393) Possibilities of welding as a joining process in airframe construction.** Krueger, U. Translated from *Schweissen und Schneiden ;* **31**: No. 9, 384-388(1979). Contract AC04-76DP03533. 12p. NTIS, PC A02/MF A01. Order Number DE83009331.

The development of welding in airframe construction is reviewed and the state of the art is described. Examples of welded components illustrate the possible applications. Electron-beam welding and - possibly - diffusion welding are also very promising. Problems of quality assurance are discussed.

24131 **Maintenance glove box for sealed master-slave manipulators.** MacFee, L.J. (Argonne National Lab., IL). *Proc. 26th Conf. on Remote Systems Tech.;* 148-151(1978).

A maintenance glove box, which has been installed in the equipment repair complex of the Hot Fuel Examination Facility/North (HFEF/N) for repairing sealed master-slave manipulator arms, increases personnel efficiency, reduces manpower requirements, and reduces personnel exposure to radiation. The transfer of a manipulator arm into the glove box is accomplished remotely, thus eliminating the need for a bagged transfer to a repair area. Also, the glove box provides 360-deg access to the manipulator from a clean area, eliminates the need for repair personnel to wear anticontamination clothing, and makes continuous coverage by health physicists unnecessary during repairs.

4203 Lasers

REFER ALSO TO CITATION(S) 24844

24132 (UCRL—52000-83-1, pp 23-31) **Laser-heated flashlamps: a step toward a soft x-ray laser.** Jan 1983. NTIS, PC A03/MF A01. Order Number DE83009213.

Portions are illegible in microfiche products.

In Energy and technology review.

Experiments conducted jointly by our Laser and NLTE Research Programs with the Laboratory's Shiva laser have explored the feasibility of using a laser-heated flashlamp to produce a bright, uniform source of x radiation in the wavelength range required for a photoexcitation pump for a soft x-ray laser.

24133 **Inductively stabilized rare-gas halide minilaser for long-pulsed operation.** Sze, R.C. (University of California, Los Alamos National Laboratory, Chemistry Division, P. O. Box 1663, Los Alamos, New Mexico 87545). *Journal of Applied Physics;* **54**: No. 3, 1224-1227(Mar 1983). Contract W-7405-ENG-36.

Inductively stabilized discharges are developed for the rare-gas halide minilasers. 6.8 mJ per pulse with 40-ns full width at half-maximum pulse lengths and 3.7 mJ per pulse with 60-ns full width at half-maximum pulse lengths are obtained for KrF. 3.1 mJ per pulse with 40-ns full width at half-maximum pulse lengths and 1.7 mJ per pulse with 60-ns full width at half-maximum pulse lengths are obtained in XeCl. The discharge dimensions are 2.5-mm electrode separation by 4 mm wide and 27.6 cm long. Orders of magnitude increases in pulse repetition frequency are obtained in devices that do not utilize gas flow.

24134 **Efficiency of free-electron lasers with a scattered electron beam.** Kwan, T.J.T.; Snell, C.M. (Advanced Concepts and Plasma Physics Group, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physics of Fluids;* **26**: No. 3, 835-839(Mar 1983).

The quality of the relativistic electron beam in a free-electron laser is an important factor in determining its efficiency of radiation production. In this work, the problem of beam quality is addressed by considering an electron beam that has a scattered velocity distribution but is otherwise monoenergetic. A newly developed particle-in-cell plasma simulation code is used to study the nonlinear stage of the free-electron laser; in particular, the efficiency of energy extraction is determined as a function of the amount of beam scattering. It is found that the mean scattering angle of the electron beam of a free-electron laser in the Raman regime is a much more sensitive parameter than expected. The efficiency of radiation production decreases rapidly for electron beams with finite scattering angles.

4204 Heat Transfer And Fluid Flow

REFER ALSO TO CITATION(S) 22929, 23435, 23468, 23469, 23542, 23577, 23620, 23834, 24104, 24105, 24107, 24110

24135 (ANL/NESC—771) TRUMP; transient & steady state temperature distribution. Elrod, D.C.; Turner, W.D. (Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048771.

TRUMP solves a general nonlinear parabolic partial differential equation describing flow in various kinds of potential fields, such as fields of temperature, pressure, or electricity and magnetism; simultaneously, it will solve two additional equations representing, in thermal problems, heat production by decomposition of two reactants having rate constants with a general Arrhenius temperature dependence. Steady-state and transient flow in one, two, or three dimensions are considered in geometrical configurations having simple or complex shapes and structures. Problem parameters may vary with spatial position, time, or primary dependent variables--temperature, pressure, or field strength. Initial conditions may vary with spatial position, and among the criteria that may be specified for ending a problem are upper and lower limits on the size of the primary dependent variable, upper limits on the problem time or on the number of time-steps or on the computer time, and attainment of steady state.IBM360,370;CDC7600; FORTRAN IV (95%) and BAL (5%) (IBM); FORTRAN IV (CDC); OS/360 (IBM360), OS/370 (IBM370), SCOPE 2.1.5 (CDC7600); As dimensioned, the program requires 400K bytes of storage on an IBM370 and 145,100 (octal) words on a CDC7600.

24136 (ANL/NESC—832) SOLA-DF; transient 2-dimensional 2-phase flow. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Travis, J.R. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048832.

Simple equation of state, relative velocity model and phase transition model are assumed. When large phase transition rates are present, because of the decoupled calculation of phase change and the pressure iteration, care must be exercised to make sure the solution is independent of the time-step. Reference report, NUREG/CR-0690.

SOLA-DF is a numerical solution algorithm for gas-liquid mixture dynamics in two space dimensions and time. The two-phase system is described by a set of mixture equations plus a relation describing the relative flow of one phase with respect to the other. The algorithm contains models to represent the interphase exchange rates of mass, momentum, and energy for water-steam mixtures.CDC7600; FORTRAN IV; SCOPE and LTSS; 124,000 (octal) words of memory are required for execution.

24137 (SAND—83-8209) Fortran computer-code package for the evaluation of gas-phase viscosities, conductivities, and diffusion coefficients. Kee, R.J.; Warnatz, J.; Miller, J.A. (Sandia National Labs., Livermore, CA (USA)). Mar 1983. Contract AC04-76DP00789. 37p. NTIS, PC A03/MF A01. Order Number DE83009358.

A Fortran computer-code package is described that is used for the evaluation of viscosities, thermal conductivities, diffusion coefficients, and thermal diffusion ratios. The package is in two parts. The first computes polynomial fits to the temperature dependent parts of the properties. The coefficients of these fits are passed to a subroutine package via a linking file. Then, any subroutine from a library of subroutines may be called to return either pure species properties or gas mixture properties. The fitting procedure significantly increases the computational efficiency of the subroutine package, yet typically it degrades accuracy by less than one percent. This package uses the chemical kinetics package CHEMKIN, and transport property subroutines are designed to be used in conjunction with the CHEMKIN subroutine library.

24138 Experimental evaluation of mass transfer from sessile drops. Coutant, R.W.; Penski, E.C. (Battelle, Columbus Lab, OH, USA). *Industrial and Engineering Chemistry Fundamentals;* **21**: No. 3, 250-254(Aug 1982).

An experimental program was conducted to determine mass transport parameters for the evaporation of sessile drops as a function of air velocity, temperature, and contact angle. It was concluded that existing literature equations can be used to calculate rates of evaporation under quiescent conditions as long as the subject liquid does not interact with air contaminants such as water. The data for over 50 evaporation runs were correlated using a Nusselt type function. The resulting function is similar in form to that for free spheres, but with the addition of a friction factor to accommodate the droplet/surface interaction with the flow stream. 10 refs.

24139 Mass transfer in a bubble-agitated liquid-liquid system. Clinton, S.D.; Perona, J.J. (Oak Ridge Natl Lab, TN, USA). *Industrial and Engineering Chemistry Fundamentals;* **21**: No. 3, 269-271(Aug 1982).

A polarographic method was used to measure the mass transfer coefficients between a mercury layer and an aqueous layer agitated by gas bubbles. The effects of gas rate, vessel size, and sparge-tube diameter were studied. The Schmidt number of the aqueous phase was varied by the use of sucrose solutions. The data are well represented by N/sub Sh/?1.33N/sub Re//sup 0.70/N/sub SC//sup 1/3/. 4 refs.

24140 Application of the method of integral relations to the calculation of two-dimensional incompressible turbulent boundary layer. Yeung, W.S.; Yang, R.J. (Lawrence Berkeley Lab., CA). *Journal of Applied Mechanics;* **48**: 701-706(Dec 1981). Contract W-7405-ENG-48.

The orthonormal version of the Method of Integral Relations (MIR) was applied to solve for a two-dimensional incompressible turbulent boundary layer. The flow was assumed to be nonseparating. Flows with favorable, unfavorable, and zero pressure gradient were considered, and comparisons made with available experimental data. In general, the method predicted very well the experimental results for flows with favorable or zero pressure gradient; for flows with unfavorable pressure gradient, it predicted the experimental data well only up to a certain distance from the initial station. This result is due to the flow not being in equilibrium beyond that distance. Finally, the scheme was shown to be efficient in obtaining numerical solutions.

4205 Materials Testing

24141 (EGG-FM—5667) Ultrasonic-image reconstruction with surface mapping and synthetic-aperture techniques. Johnson, J.A.; Barna, B.A. (EG and G Idaho, Inc., Idaho Falls (USA)). Sep 1982. Contract AC07-76ID01570. 37p. NTIS, PC A03/MF A01. Order Number DE83009197.

Synthetic-aperture image-enhancement techniques have been used to improve the resolution in ultrasonic images. In general it is believed that global surface variations will not degrade the resolution of the image but only produce errors in the location of the image relative to the actual location of the flaw. A sample which has a surface variation which is not untypical of the shrinkage around a weld is imaged in ultrasound. The image produced with standard synthetic-aperture enhancement which does not include corrections for the surface variations is of no better quality than the unenhanced image. The image produced accounting for the surface variations by using the front surface echo to map the surface does resolve the flaws. However, due to transducer side-lobe interference, the front-surface echo does not map the surface accurately enough for the enhancement algorithm to produce precise locations for the images of the flaws. Enhanced images of targets viewed with ultrasonic shear waves also show improved resolution. However, the problems with transducer side-lobes interfering with the front surface echo are worse with shear waves. Also the reconstruction process is more complex. Both these lead to inaccuracies in the locations of the flaws. Phase and amplitude measurements of waves reflected from a crack as a function of frequency and aperture position show promise of discriminating crack size. Meas-

urements made on stainless-steel bars with fatigue cracks are discussed.

24142 **(PNL-SA—9511) Fatigue-crack monitoring in-flight using acoustic emission - hardware, technique, and testing.** Hutton, P.H.; Skorpik, J.R.; Lemon, D.K. (Pacific Northwest Lab., Richland, WA (USA)). Jul 1981. Contract AC06-76RL01830. 13p. (CONF-8109207—1). NTIS, PC A02/MF A01. Order Number DE83007573.

From ATA non-destructive testing forum; Phoenix, AZ, USA (1 Sep 1981).

Portions are illegible in microfiche products.

The three programs described represent a logical evolutionary process toward effective flaw surveillance in aircraft using AE. The Macchi tests showed that an AE system can withstand extended in-flight service and collect meaningful information relative to fatigue crack growth at a single specific location. The MIrage aircraft work seeks to extend the methods demonstrated on the Macchi into a more complex circumstance. We are now attempting to detect and locate crack growth at any of twenty fastener locations in a relatively complex geometry. The DARPA pattern recognition program seeks to develop signal identification capability that would pave the way for general monitoring of aircraft structures using AE to detect fatigue crack growth. It appears that AE technology may be capable of enhancing aircraft safety assurance while reducing inspection requirements with the associated costs.

24143 **(UCID—19677) NIKE2D: a vectorized, implicit, finite-deformation, finite-element code for analyzing the static and dynamic response of 2-D solids.** Hallquist, J.O. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 112p. NTIS, PC A06/MF A01. Order Number DE83008177.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report provides a user's manual for NIKE2D and a brief description of the implicit algorithm. Sample applications are presented including a simulation of the necking of a uniaxial tension specimen, a static analysis of an O-ring seal, and a cylindrical bar impacting a rigid wall. NIKE2D is a fully vectorized, implicit, finite-deformation, large-strain, finite-element code for analyzing the response of two-dimensional axisymmetric and plane-strain solids. A variety of loading conditions can be handled including traction boundary conditions, displacement boundary conditions, concentrated nodal point laods, body force loads due to base accelerations, and body-force loads due to spinning. Slide-lines with interface friction are available. Elastic, orthotropic-elastic-plastic, thermo-elastic-plactic, soil and crushable foam, linear viscoelastic, thermo-orthotropic elastic, and elastic-creep materials models are implemented. Nearly incompressible behavior that arises in plasticity problems and elasticity problems with Poisson's ratio approaching 0.5 is accounted for in the element formulation to preclude mesh lock-ups and associated anomalous stress states. Four-node isoparametric elements are used for the spatial discretization, and profile (bandwidth) minimization is optional.

4206 Safety Engineering

REFER ALSO TO CITATION(S) 23420

4207 Vacuum Engineering

24144 **(BNL—31913) Very small ionization pressure gauge.** Edwards, D. Jr. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 14p. (CONF-821111—22). NTIS, PC A02/MF A01. Order Number DE83008589.

From 29. national symposium on American Vacuum Society; Baltimore, MD, USA (16 Nov 1982).

A very small ionization pressure gauge has been developed to operate in the pressure range 10^{-6} Torr to 100μ. A metal construction and external cooling fins result in a very rugged device with exceptionally small outgassing properties. The gauge also incorporates a replaceable filament-grid assembly on a single plug which allows the simple replacement of both the filament and the grid when needed.

24145 **(INFN/TC—80/8) New vacuum systems for the 7 MEV CN accelerator of the Legnaro National Laboratory.** Rossi-Alvarez, C.; Bezzon, G. (Istituto Nazionale di Fisica Nucleare, Legnaro (Italy). Lab. Nazionale di Legnaro). 18 Aug 1980. 9p. (In Italian). NTIS (US Sales Only), MF A01. Order Number DE82903235.

Microfiche only, copy does not permit paper copy reproduction.

Test results are given for DIFFSTAK oil-loaded and Fomblin LVAC vacuum pumps as used in the CN accelerator at the Italian National Nuclear Physics Institute in Frascati. Electronic circuitry of the automated pumps is also illustrated. 4 figures.

4208 Electronic Circuits And Devices

REFER ALSO TO CITATION(S) 24102, 24750

4209 Waste Processing Plants And Equipment

REFER ALSO TO CITATION(S) 23217

24146 **(RFP-Trans—384) Waste-water treatment process.** Endo, M.; Okada, S.; Hayashi, S. (950 8834). Feb 1983. Contract AC04-76DP03533. Translation of Japanese Kokai Patent Publication No. Sho 53-108657 (1978). 7p. NTIS, PC A02/MF A01. Order Number DE83003158.

Disclosed is a waste-water treatment process in which coagulant and fine magnetic powder is added to the waste water in order to collect the suspended particles by magnetic flocs, after which the particles are separated and removed by a magnetic separator, characterized by the fact that one or more ferrites such as Ba ferrite, Sr ferrite, Ni-Zn ferrite and Mn-Zn ferrite are used as the fine magnetic powder and that they can be recovered and reused repeatedly by incinerating the separated and removed flocs at 800 to 900°C and pulverizing the residual solid.

24147 **(RFP-Trans—382) Waste-water treatment apparatus.** Takagi, M.; Fujita, T. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Feb 1983. Contract AC04-76DP03533. Translation of Japanese Patent Publication No. Sho 55-23109 (1980). 7p. NTIS, PC A02/MF A01. Order Number DE83008678.

The design and operation of equipment for lowering the COD and BOD of domestic and industrial waste water are described. The invention is intended for the treatment of waste water in a very short time at low waste water in a very short time at low cost. It incorporates the harmful organic substances, which represent the main part of the COD and BOD activity, into spinel or inverse-spinel structures by means of iron ions, and then removes the product magnetically.

4210 Combustion Systems

REFER ALSO TO CITATION(S) 22994, 22998, 23047, 23415

24148 **(ANL/FE—82-4) Exploratory and basic fluidized-bed combustion studies. Annual report, October 1980-September 1981.** Johnson, I.; Myles, K.M.; Fee, D.C.; Moulton, D.S.; Shearer, J.A.; Smith, G.W.; Turner, C.B.; Wilson, W.I. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 80p. NTIS, PC A05/MF A01. Order Number DE83008725.

Development work has been done in support of atmospheric and pressurized fluidized-bed combustion. Sulfur retentions obtained in fluidized-bed combustors were compared with results obtained by thermogravimetric analysis to identify the reasons for discrepancies in results from the two sulfation devices. In other work, basic studies and engineering studies were performed on the process for enhancing limestone sulfation by hydrating partially sulfated stone. Other laboratory studies were carried out to determine (1) the effect of attrition on the particle size distribution of sorbents in a pneumatic transport system and (2) why some stones exhibit pop-

ping (explosive disintegration) when subjected to shock calcination and some do not.

24149 (CONF-810581—3) Standardized test methods for investigating attrition and elutriation characteristics of natural sorbents in fluidized-bed coal combustors. Wilson, W.I.; Fee, D.C.; Myles, K.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83008602.

From Powder and bulk solids conference; Chicago, IL, USA (12 May 1981).

Experimental techniques and standard laboratory test methods have been developed to measure the attrition and elutriation characteristics of limestones in an atmospheric-pressure fluidized-bed coal combustor (AFBC) at 850°C. The laboratory test device used to measure the attrition characteristics of a sorbent is a small laboratory size fluidized bed. The elutriation rate and the attrition constant were determined for a group of limestones when the system is assumed to be at steady state; i.e., after sorbent breakup due to thermal shock and decrepitation during calcination of the sorbent feed has occurred. An attrition model has been developed to analyze the laboratory data and to predict sorbent performance in AFBCs. The attrition model, based on a stoichastic model proposed by Fan and Srivastava, assumes that the particle disintegration is such that the abrasive removal of material occurs only from the surface of the particle. The attrition constants of the limestones tested ranged from 1.5×10^{-6} sec^{-1} to 9.2×10^{-6} sec^{-1}, and the elutriation rate had a fractional mass loss which ranged from 8.1×10^{-6} min^{-1} to 1.0×10^{-3} min^{-1}. The standard tests utilized by the model are undergoing refinement to improve the accuracy of the predictions.

24150 (CONF-821176—1) Advanced pressurized fluidized-bed combustion. Podolski, W.F.; McClung, J.D. (Argonne National Lab., IL (USA); Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007641.

From International conference on combustion of tomorrow's fuels; Santa Barbara, CA, USA (8 Nov 1982).

Portions are illegible in microfiche products.

The motivation for and driving force behind the development of advanced PFBC concepts in the areas of process improvements and economic improvements are discussed. Among the former are increased cycle efficiency, improved load following capability, simplified and improved coal feeding techniques, increased sorbent utilization, and reduced NO/sub x/ emissions. Potential economic improvements are in the areas of lowering capital costs and operating costs as a result of the process-related improvements. Such improvements are based on inherent limitations in the current design of PFBC systems, for example, in upper temperature limitations and processing capacity. Means to circumvent these limitations, primarily comprising development of two classes or types of advanced concepts have been proposed by numerous investigators. Circulating PFBC systems show a high potential for being able to provide a large degree of improvement in several key areas, as does a staged, devolatilizer/PFBC hybrid type system. Development of these systems requires considerable effort, both from a more basic process chemistry standpoint and from a power plant engineering standpoint.

24151 (DOE/MC/14129—1375) High pressure combustor at Leatherhead Test seven results: dolomite size effects. (National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.). Jan 1983. Contract AC21-80MC14129. 53p. NTIS, PC A04/MF A01. Order Number DE83008237.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A fluidized-bed combustor was built to investigate the effect of pressure (up to 20 atm) on combustion efficiency, sulphur retention, NO/sub x/ emission, heat transfer, and elutriation. Results are reported for a test in which the main objectives were: to assess the effect on sulphur retention and bed size distribution of using a finer dolomite size distribution; and to operate over a wide temperature range. The results showed the reduction in the size of the feed had a major effect on the size distribution of the bed, but did not appear to have any effect on the heat transfer coefficients. Sulphur retention may have been slightly higher with the smaller particles and increased slightly as the bed temperature increased. In this test sulphur retention was 92% at a Ca/S ratio of 2.1 and a bed temperature of 1385°F, and 94% at a Ca/S ratio of 1.9 and a bed temperature of 1720°F. SO_3 concentrations were in the range 3 to 6 vppm, rising to 30 to 90 vppm if the dolomite feed ws shut off for several minutes. Combustion efficiency increased with bed temperature, being 97.5%; 99.4%; 99.9% at bed temperatures of 1385°F; 1550°F; 1655°F and 1720°F respectively. Alkali vapor measurements indicated concentrations in the exhaust of 0.2 to 0.8 wppm Na and 0.2 to 1.9 wppm K, and was independent of bed temperature. Gas sample traverses made at two levels in the bed indicated more combustion at the bottom of the bed than in previous tests. This was presumably due to the finer size distribution of the bed, since the coal size distribution was the same as in previous tests.

24152 (PB—83-126292) Multi-fuel low-NO/sub x/ burner development, Phase II. Final report Mar 79-Feb 82. Abbasi, H.A.; Khinkis, M.J.; Waibel, R.T. (Institute of Gas Technology, Chicago, IL (USA)). May 1982. 236p. NTIS, PC A11/MF A01.

The objective of this program was to develop high-efficiency, low-nitrogen-oxides producing multi-fuel industrial burners having flame and heat-transfer characteristics that are suitable for specific industrial processes in cooperation with burner manufacturers for process heating applications. Burners for three industrial processes were designed to achieve a reduction in NOx emissions compared with currently used standard burners: (1) A high excess air burner used in direct air dryers for applications in the food processing industry, (2) A hot air burner having high convective heat transfer for direct fired metal processing furnaces, and (3) A hot air burner with a long, luminous flame for direct fired process furnaces in the steel, aluminum, and glass industries. Bench scale tests on catalytic combustors verified the possibility of achieving extremely low-NOx emissions from a burner designed for food drying applications. Unfortunately, the high preheat temperature required for the air/fuel mixture is impractical. The high-convective, hot air burner achieved NOx emission reduction of up to 50%. However, additional work is required to determine whether or not the burner would perform adequately in metal processing applications. NOx emissions from the hot air burner with a long, luminous flame were 45 to 60% lower than the standard burner. Although the flame characteristics were slightly different, they seemed acceptable for many industrial applications.

24153 (PB—83-128116) Converting small industrial boilers to burn wood fuels. Forest Service research paper (final). Sarles, R.L.; Rutherfoord, J.P. (Forest Service, Broomall, PA (USA). Northeastern Forest Experiment Station). 1982. 14p. NTIS, PC A02/MF A01.

The engineering and economic feasibility of retrofitting two small industrial boilers (32 hp and 52 hp, respectively) for firing green wood fuels was studied. Subjects covered include fuel requirements and costs; availability, storage, and handling of wood fuels; and designs, specifications, stack emissions, cost estimates, and economic feasibility. The economics of boiler conversion projects are heavily dependent on annual savings in fuel costs. Analyses of variables affecting annual fuel savings determined that the boiler utilization rate (BUR) and the price of fuel oil had the greatest impact on the economic feasibility of this project.

24154 (PB—83-136218) Oxy-fuel burner development program. Final report Jul 81-May 82. Gitman, G.M.; Battles, D.D.; Smith, D.B.; West, L.T. (Thermecon, Atlanta, GA (USA)). May 1982. 68p. NTIS, PC A04/MF A01.

The purpose was to develop and laboratory test an oxy-fuel burner for electric arc furnaces that overcomes the reliability and durability problems inherent in existing designs. A ten million B/hr laboratory-scale burner was developed and successfully tested. The burner is designed to mount permanently on the furnace wall and to generate a strongly directional, high-velocity flame. The graphite burner body is designed to withstand the severe environment of an electric arc furnace with a minimum amount of cooling water.

4220 Underground Engineering

24155 Locating a buried magnetic dipole. Caffey, T.W.H.; Romero, L. (Sandia Natl Lab, Albuquerque, NM, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Geoscience and Remote Sensing;* **GE-20**: No. 2, 188-192(Apr 1982).

Five measurements of the magnetic-field vector near the surface of the earth are shown to be sufficient to determine the orientation and location of a buried magnetic dipole. A discussion of field experiments which demonstrate the location concept is included. 6 refs.

4230 Marine Engineering

REFER ALSO TO CITATION(S) 23904, 23905

24156 (MPL-U—34/78) Deep-towed RUM III: a third-generation remote underwater manipulator. Spiess, F.N.; Anderson, V.C. (Scripps Institution of Oceanography, San Diego, CA (USA). Marine Physical Lab.). 1978. Contract AT03-76SF70281. 29p. NTIS, PC A03/MF A01. Order Number DE83008985.

Portions are illegible in microfiche products.

This report highlights the first four months effort by MPL in the carrying out of Phase One Design of a Towed/Bottom Sea Floor Research Platform - UCSD 0955. A variety of design concepts and configurations which are considerd by MPL to be suitable for application to the development of the deep ocean survey/work vehicle Deep Towed RUM III are described.

4240 Pollution Control Equipment

REFER ALSO TO CITATION(S) 22945, 22947, 22953, 22954, 24152

4250 Power Cycles

REFER ALSO TO CITATION(S) 23397

24157 (CONF-810545—10) Predicting the performance and cost of ORC waste-heat-recovery systems. Krazinski, J.L.; Bushby, H.M.; Buyco, E.H. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83008601.

From 3. conference on waste heat management and utilization; Miami, FL, USA (12 May 1981).

Portions are illegible in microfiche products.

Organic Rankine Cycle (ORC) systems have been designed and tested for the recovery of waste heat from low-temperature sources. These systems use organic working fluids, rather than steam, in the cycle. A computer code was developed to predict the power outputs and costs of these systems. Six organic fluids and steam are considered in this paper. The thermophysical properties of the seven fluids are compared and their impact upon the system design is discussed. System costs are presented for exhaust-gas heat sources with maximum temperatures of 500 to 1000F. The power outputs in these cases range from approximately 500 kW to 2500 kW. Certain organic fluids are restricted to the lower-heat-source temperatures because of thermal-stability limitations. For the heat-source temperatures at which the various fluids were used, however, similar system costs and power-output levels were obtained for the six organic fluids.

24158 (DOE/ER/10640—3) Topics in finite time thermodynamics. Berry, R.S. (Chicago Univ., IL (USA)). 1983. Contract AC02-80ER10646. 7p. NTIS, PC A02/MF A01. Order Number DE83009237.

DOE-sponsored research programs at the University of Chicago on processes for generating mechanical work, processes involving chemical work, and thermodynamics are briefly reviewed. (LCL)

43 PARTICLE ACCELERATORS

REFER ALSO TO CITATION(S) 24574

4301 Design, Development, And Operation

REFER ALSO TO CITATION(S) 24596, 24822

24159 (CONF-821066—3) Terminal lens for an FN tandem. Den Hartog, P.K.; Munson, F.H.; Heath, C.E. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83008692.

From Symposium for Northeastern Accelerator personnel; Seattle, WA, USA (6 Oct 1982).

An electrostatic quadrupole triplet (ELQT) will be installed in the terminal of the Argonne FN tandem accelerator. The lens will be used in conjunction with foil stripping to maximize the transmission of heavy ions through the high-energy accelerator tube. The lens has steering capability and is controlled by a microcomputer located in the terminal.

24160 (HMI—373, pp 127) Modification of the An 400 accelerator. Stettner, U.; Nolte, G.; Schiwietz, G.; Werner, H.C. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.

In Scientific progress report 1981.

24161 (HMI—373, pp 129-131) Operation of VICKSI. Arndt, P.; Busse, W.; Haesselbarth, R.; Kiehne, T.; Martin, B.; Michaelsen, R.; Pelzer, W.; Ziegler, K. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.

In Scientific progress report 1981.

24162 (LA—8775-C, pp 477-486) High intensity accelerator facility. Teng, L.C. (Fermilab, Batavia, IL). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The unique requirement for this medium energy (10 to 20 GeV) facility is the high intensity. The intensity desired is some two orders of magnitude higher than that now available and is considered sufficient justification for a new facility. We choose for discussion here an energy of 16 GeV (rather arbitrary) and an average beam current of 100 μA ($6x10^{14}sec^{-1}$).

24163 Los Alamos: present projects in accelerator technology. *CERN Courier;* **22**: No. 9, 359-360(Nov 1982).

Published in summary form only.

24164 Development of copper electroplating for large accelerating structures for heavy ion fusion. Klimczak, G.W.; Stockley, R.L. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1729-1731(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A program was undertaken at Argonne National Laboratory to develop a high electrical conductivity copper electrodeposit for the Linear Accelerator (LINAC) tanks for the Heavy Ion Fusion (HIF) test bed. The purpose of this investigation was to determine the effects of changes in operating parameters on the physical and mechanical properties of high electrical conductivity electrodeposits. Based upon the information discerned from the small-scale laboratory evaluation, the process was geared up to a full-scale opearation. An engineering study was required to determine the proper

electroplating parameters to be utilized within the constraints of a commerical electroplater.

4302 Beam Dynamics, Field Calculations, And Ion Optics

REFER ALSO TO CITATION(S) 24159, 24194

24165 **(ANL/NESC—791) TRANSPORT; design of charged particle beams.** Rothacker, F. (Stanford Linear Accelerator Center, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048791.

The effects of space charge are assumed to be negligible.

The first- and second-order optical properties of static-magnet charged particle beam transport systems are analyzed. The program can vary some of the physical parameters of the elements comprising the system and impose various constraints on the beam design.IBM370; FORTRAN IV; OS/370; 320K bytes of memory, a card input unit, and printer and punch output units are used. Numerous versions of TRANSPORT are available for other computers as well as overlayed versions for IBM computers.

24166 **(ANL/NESC—807) SLACKLY; 1-dimensional multicavity klystron tube analysis.** Russell, D.; Tice, B. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048807.

Highly relativistic simulations may fail.

SLACKLY performs a one-dimensional analysis of a multicavity Klystron tube. Its formulation is based on the application of polarization variables to the physics of the propagation of a confined beam of electrons within a drift tube and the interaction of this beam with the cavities of the Klystron. By specifying the geometry of the Klystron and an appropriate set of initial conditions, a comprehensive analysis of the tube's characteristics will result. Space charge effects and higher-order harmonics are included in the simulation.IBM360,370; FORTRAN IV; OS/360,370; The program requires 172K bytes of memory and standard input and output units for execution.

24167 **(ANL/NESC—983) EGUN; calculation of electron trajectories.** Herrmannsfeldt, W.B. (Stanford Linear Accelerator Center, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048983.

Maxima of - 9001 mesh points in a square mesh 300 mesh points in the axial direction 100 mesh points in the radial direction 101 potentials 51 rays In cylindrical coordinates, the magnetic fields are axially symmetric. In rectangular coordinates, any orientation of a two-dimensional magnetic field is possible.

EGUN, the SLAC Electron Trajectory Program, computes trajectories of charged particles in electrostatic and magnetostatic focusing systems including the effects of space charge and self-magnetic fields. Starting options include Child's Law conditions on cathodes of various shapes, user-specified initial conditions for each ray, and a combination of Child's Law conditions and user specifications. Either rectangular or cylindrically symmetric geometry may be used. Magnetic fields may be specified using arbitrary configuration of coils, or the output of a magnet program, such as Poisson, or by an externally calculated array of the axial fields.IBM370,303x,3081; FORTRAN IV (99%) and Assembler (1%); OS/MVS, OS/SVS, VM; 450K bytes of memory and two direct-access devices (logical units 1 and 8 are required)..

24168 **(LA-UR—81-2661) Use of the radio-frequency quadrupole structure as a cyclotron axial-buncher system.** Hamm, R.W.; Swenson, D.A.; Wangler, T.P. (Los Alamos National Lab., NM (USA)). 1981. Contract W-7405-ENG-36. 6p. (CONF-810944—11). NTIS MF A01. Order Number DE82000588.

From 9. international conference on cyclotrons and their applications; Caen, France (7 Sep 1981).

Microfiche only, copy does not permit paper copy reproduction.

The radio-frequency quadrupole (RFQ) is a new linear accelerating structure being developed as a low-velocity linac. In this structure rf electric fields are used to simultaneously focus, bunch, and accelerate ions. The slow introduction of the accelerating field results in the adiabatic bunching of a dc ion beam with a large capture efficiency. Realistic computer simulations have shown that this new structure could also be used as a buncher in the axial injection system of a cyclotron. A description of the RFQ geometry and its general properties is given. A preliminary design is presented for a variable frequency RFQ to be used as buncher in the axial injection system of a variable energy cyclotron. The operating parameters for this RFQ are discussed.

24169 **(SAND—83-0558C) Intense electron-beam autogenerator.** Mazarakis, M.G.; Shope, S.L.; Smith, D.L.; Miller, R.B.; Adler, R.J. (Sandia National Labs., Albuquerque, NM (USA); Mission Research Corp., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 6p. (CONF-830311—5). NTIS, PC A02/MF A01. Order Number DE83007710.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Portions are illegible in microfiche products.

A novel autogeneration mechanism was conceived and used to generate and accelerate an intense relativistic electron beam. This was accomplished via the passage of a primary relativistic electron-beam pulse through an uncharged pulse-forming transmission-line cavity. A second beam pulse was generated with the same duration as the primary beam, e.g., 10 to 20 nsec, but delayed by a time interval equal to the double transit time of the induced electromagnetic wave inside the cavity.

24170 **Brookhaven: preparing for polarized protons.** *CERN Courier;* 22: No. 9, 370-371(Nov 1982).

Published in summary form only.

4303 Auxiliaries And Components

REFER ALSO TO CITATION(S) 24165, 24196, 25114, 25139

24171 **(ANL—83-14) Evaluation of structural integrity of IPNS-I and ZING-P' targets.** Carpenter, J.; Ahmed, H.; Loomis, B.; Ball, J.; Ewing, T.; Bailey, J.; D'Souza, A.F. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 162p. NTIS, PC A08/MF A01. Order Number DE83008918.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report discusses the design, production, and evaluation of clad uranium-alloy targets that function as spallation neutron sources in the ZING-P' and IPNS-I facilities with a pulsed (10 to 30 Hz), 500-MeV proton beam. The methodology and results of theoretical nuclear-particle transport, heat transport, and stress analyses that were used in the development of a design for the targets are described. The production of a zirconium-clad uranium-alloy cylinder for ZING-P' and Zircaloy-2-clad uranium-alloy discs for IPNS-I is discussed with particular attention to the procedural details. The theoretical analyses were verified by measuring the thermal and mechanical response of the clad uranium under conditions designed to simulate the operations of the pulsed-neutron sources.

24172 **(CONF-810523—19) Data acquisition system for the neutron scattering instruments at the intense pulsed neutron source.** Crawford, R.K.; Daly, R.T.; Haumann, J.R.; Hitterman, R.L.; Morgan, C.B.; Ostrowski, G.E.; Worlton, T.G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 17p. NTIS, PC A02/MF A01. Order Number DE83008600.

From Topical conference on computerized data acquisition in particle and nuclear physics; Oak Ridge, TN, USA (28 May 1981).

Portions are illegible in microfiche products.

The Intense Pulsed Neutron Source (IPNS) at Argonne National Laboratory is a major new user-oriented facility which is now coming on line for basic research in neutron scattering and neutron radiation damage. This paper describes the data-acquisition system which will handle data acquisition and instrument control for the time-of-flight neutron-scattering instruments at IPNS. This discussion covers the scientific and operational requirements for this system, and the system architecture that was chosen to satisfy these requirements. It also provides an overview of the current system implementation including brief descriptions of the hardware and software which have been developed.

24173 **(CONF-811012—67) IPNS distributed-processing data-acquisition system.** Haumann, J.R.; Daly, R.T.; Worlton, T.G.; Crawford, R.K. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83008608.

From IEEE symposium on nuclear science; San Francisco, CA, USA (21 Oct 1981).

Portions are illegible in microfiche products.

The Intense Pulsed Neutron Source (IPNS) at Argonne National Laboratory is a major new user-oriented facility which has come on line for basic research in neutron scattering and neutron radiation damage. This paper describes the distributed-processing data-acquisition system which handles data collection and instrument control for the time-of-flight neutron-scattering instruments. The topics covered include the overall system configuration, each of the computer subsystems, communication protocols linking each computer subsystem, and an overview of the software which has been developed.

24174 **(CONF-820428—11) On-line laser spectroscopy with a cooled He-jet transport system.** Lewis, D.; Evans, R.; Davids, C.; Finn, M.; Greenlees, G.; Kaufman, S. (Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Physics; Argonne National Lab., IL (USA); Minnesota Univ., Minneapolis (USA). Dept. of Physics). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008529.

From Conference on lasers in nuclear physics; Oak Ridge, TN, USA (21 Apr 1982).

Portions are illegible in microfiche products.

In order to make nuclear size and shape determinations for short-lived nuclei, we are using a transport system with pure, cooled helium to carry radioactive atoms produced by heavy-ion reactions from the target chamber into a laser-spectroscopy chamber. The device is attached to a beam line of the Argonne Superconducting Heavy-Ion Linac. Upon leaving the transport system, the atoms form a cooled atomic beam suitable for several high-sensitivity, high-precision spectroscopic techniques. We plan to use the photon-burst method which permits high-resolution hyperfine structure measurements with only a few atoms per second. The efficiency of the helium-jet system, the extension of the photon-burst method to slow and optically-pumped transitions, and the present status of the project are discussed.

24175 **(CONF-821123—38) Some specialized radiological-safety considerations at Argonne National Laboratory's Heavy Ion Research Facility (SAR, Shielding Design, Q.F.'s, HIRC).** Cooke, R.H.; Wynveen, R.A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83008645.

From 7. conference on the application of accelerators in research and industry; Denton, TX, USA (8 Nov 1982).

The ATLAS facility at Argonne uses a tandem Van de Graaff, a booster linac, and the ATLAS linac to accelerate beams of heavy ions to energies of (5 to 25 MeV/A). The radiological hazards unique to this facility are considered along with safety considerations normally addressed at accelerators. (GHT)

24176 **(DOE/ER/40017—4) Polarized electron source for parity experiment at Bates.** Souder, P.; Barber, A.; Bertozzi, W. (Harvard Univ., Cambridge, MA (USA); City Coll., New York (USA); Massachusetts Inst. of Tech., Cambridge (USA); CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France); Yale Univ., New Haven, CT (USA)). 1981. Contract AC02-81ER40017. 6p. (CONF-820941—15). NTIS, PC A02/MF A01. Order Number DE83007421.

From 5. international symposium on high energy spin physics; Upton, NY, USA (16 Sep 1982).

We are constructing a polarized electron source in order to study parity violation in elastic electron-carbon scattering at the MIT Bates Linac. The source uses a GaAs photocathode illuminated by light from an infrared krypton ion laser. Our design, which uses a multi-chamber vacuum system, meets the special requirements for operation at Bates.

24177 (HMI—373, pp 111-113) **Target laboratory.** Bader, A.; Baier, H.; Franke, C.; Grabisch, K.; Schardin, R. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

In Scientific progress report 1981.

For experiments at VICKSI 1981 as in the preceding year about 600 foil targets were fabricated. A third of these targets consisted of isotopic pure material of fourty different isotopes. About 100 of these isotope targets were rolled.

24178 (HMI—373, pp 125) **Field studies of an analyzing magnet and calculation of ion trajectories for charge exchange experiments.** Schwietz, G.; Nolte, G. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.

In Scientific progress report 1981.

24179 (HMI—373, pp 126) **Construction of an apparatus for charge exchange.** Janke, M.; Nolte, G. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.

In Scientific progress report 1981.

24180 (HMI—373, pp 128) **VICKSI: General remarks.** 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.

In Scientific progress report 1981.

24181 (HMI—373, pp 132-133) **Tandem-injector for VICKSI.** Busse, W.; Martin, B.; Michaelsen, R.; Pelzer, W.; Renner, D.; Spellmeyer, B.; Ziegler, K. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.

In Scientific progress report 1981.

24182 (LA—8775-C, pp 499-506) **Antinucleon time separated beams (TSB).** Kalogeropoulos, T.E. (Syracuse Univ., NY). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The work which was performed at the AGS in search of a narrow bunched proton beam is summarized. The encouraging results lead to the concept and design of a time separated antiproton beam. This beam is more intense and of higher luminosity than any of the past, present and projected antiproton beams.

24183 **(LA—9511-C) Proceedings of the workshop on LAMPF II synchrotron.** Cooper, R.K. (comp.). (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 92p. (CONF-820276—). NTIS, PC A05/MF A01. Order Number DE83008275.

From Workshop on LAMPF II synchrotron; Los Alamos, NM, USA (8 Feb 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Topics covered at the workshop include: considerations for a staged approach to synchrotron construction; consideration of energy and cost for a kaon and/or antiproton factory; changing the transition energy in the main ring for the Fermilab antiproton beam; a lattice with 50% undispersed straight sections; bunch width considerations in a stretcher ring; a self-consistent longitudinal distribution; rapid-cycling tuned rf cavity for synchrotron use; considerations on a high-shunt impedance tunable RF cavity; rotating condensers; low extraction from the stretcher ring; an antiproton source for LAMPF II; synchrotron magnet circuit; power supply and ring magnet options; and notes for a kaon factory design. (GHT)

24184 **(LA—9537-MS) Los Alamos Meson Physics Facility high-resolution-spectrometer dipole magnets: a summary report.** Kozlowski, T.; Madland, D.G.; Rolfe, R.; Smith, W.E.; Spencer, J.E.; Tanaka, N.; Thiessen, H.A.; Varghese, P.; Wilkerson, L.C. (Los Alamos National Lab., NM (USA)). Dec 1982. Contract W-7405-ENG-36. 114p. NTIS, PC A06/MF A01. Order Number DE83008361.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report explains the design, fabrication, measurement, optimization, and installation of two 122-metric ton electromagnets for the High Resolution Proton Spectrometer at the Los Alamos Meson Physics Facility. These two magnets are the principal components of the proton spectrometer, which has an energy resolution of $\leqq 10^{-4}$ FWHM. Many technical problems occurred during fabrication, measurement, and optimization, and the majority have been successfully solved. We hope that this report will help others planning similar projects.

24185 **(SAND—82-2453C) Multistage pulsed-power electron accelerators.** Prestwich, K.R.; Hasti, D.E.; Miller, R.B.; Sharpe, A.W. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 5p. (CONF-830311—7). NTIS, PC A02/MF A01. Order Number DE83009165.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Portions are illegible in microfiche products.

Pulse-power developments in high-current linear accelerators (RADLAC I) and low-impedance water transmission lines (PBFA I) are reviewed. The design of Hermes III, a 1.1-MA, 15-MV linear accelerator based on these technologies is discussed and initial data on the development of this accelerator is presented.

24186 **(SAND—83-0514C) Cherenkov light as a current-density diagnostic for large-area, repetitively pulsed electron beams.** Buttram, M.; Hamil, R. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 4p. (CONF-830311—10). NTIS, PC A02/MF A01. Order Number DE83009193.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Portions are illegible in microfiche products.

Cherenkov light intensity is an ideal electron-beam current-density diagnostic, giving information about the beam's spatial distribution as a function of time during a pulse. It is free of the fluorescence and saturation often observed in scintillators provided a suitable radiator is chosen. Plate glass has been used for single pulse applications. For repetitively pulsed beams a flowing liquid radiator is used to reduce problems arising from heating and decomposition of the material. Light output is sufficient to study 1 A/cm^2, 250 kV beams with ASA 3000 speed film. Streak photography also appears possible.

24187 **(SAND—83-0628C) IBEX foilless diode experiments.** Miller, R.B.; Mazarakis, M.G.; Poukey, J.W.; Adler, R.J. (Sandia National Labs., Albuquerque, NM (USA); Mission Research Corp., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 6p. (CONF-830311—9). NTIS, PC A02/MF A01. Order Number DE83009185.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Portions are illegible in microfiche products.

A new high voltage isolated Blumlein accelerator (IBEX) has been designed and constructed. A new accelerator pulse-forming-line (PFL) configuration produces an output voltage pulse equal to the PFL charge voltage for a matched load (as in a conventional Blumlein circuit); however, the prepulse level is negligible and both sides of the diode remain at electrostatic ground potential. With a matched planar diode load, IBEX has generated a 4 MeV, 100 kA electron beam. In the present stage of experimentation, a foilless diode load is being used to produce 3 to 4 MeV, 20 to 30 kA annular electron beams with an applied magnetic field strength of $\sim$ 10 kG.

24188 **(SAND—83-0649C) IFA-2 collective-ion-accelerator system.** Olson, C.L.; Frost, C.A.; Patterson, E.L.; Poukey, J.W. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 13p. (CONF-830311—8). NTIS, PC A02/MF A01. Order Number DE83009163.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Portions are illegible in microfiche products.

A second-generation ionization-front accelerator system (IFA-2) is being brought into operation. Results of IFA-2 IREB optimization experiments, laser-characterization experiments, beam-switch experiments, and laser-deflector experiments are presented. The status of the IFA-2 system is summarized.

24189 **(UCRL—88283) Recent performance improvements on FXR.** Kulke, B.; Kihara, R. (Lawrence Livermore National Lab., CA (USA)). 1983. Contract W-7405-ENG-48. 5p. (CONF-830311—6). NTIS, PC A02/MF A01. Order Number DE83009238.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Portions are illegible in microfiche products.

The FXR machine is a nominal 4-kA, 20-MeV, linear-induction, electron accelerator for flash radiography at LLNL. The machine met its baseline requirements in March 1982. Since then, the performance has been greatly improved. We have achieved stable and repeatable beam acceleration and transport, with over 80% transmission to the tungsten bremsstrahlung target located some 35 m downstream. For best stability, external-beam steering has been eliminated almost entirely. We regularly produce over 500 Roentgen at 1 m from the target (TLD measurement), with a radiographic spot size of 3 to 5 mm. Present efforts are directed towards the development of a 4-kA tune, working interactively with particle-field and beam transport code models. A remaining uncertainty is the possible onset of RF instabilities at the higher current levels.

24190 **Orbital stability of the high-current betatron.** Barak, G.; Rostoker, N. (Department of Physics, University of California, Irvine, California 92717). *Physics of Fluids;* **26**: No. 3, 856-866(Mar 1983).

Orbital stability of the high-current betatron is analyzed. In this modified betatron a toroidal magnetic field is added to the conventional betatron magnetic field. This increases substantially the space charge limit during injection. It gives rise, however, to new problems during acceleration, such as ring stability, Fermi drift, and orbital resonances. A detailed analysis is presented showing that two serious problems may arise: (i) The beam becomes highly unstable when the net focusing force on it becomes zero. The dominant instability in this region is the Fermi drift. This may, however, be utilized in extracting the beam. (ii) Errors in the vertical (betatron) magnetic field result in driven resonances that must be crossed during acceleration. The amplitude growth of the transverse betatron oscillations due to these resonances is negligible up to very high γ (low n resonances). In practice, it may become very

difficult to cross the n = 1 resonance. Thus, extracting the beam again making use of the Fermi drift while n>1 is preferable.

24191 **Remote target removal for the Oak Ridge 86-in. cyclotron.** Walls, A.A.; Haynes, D.L.; Skidmore, M.R.; Terry, J.W. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 629-630(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

24192 **History of remote handling at LAMPF.** Lambert, J.E.; Grisham, D.L. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **41**: 628-629(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

24193 **Shielded beam channel septum magnet.** Heese, R.N. (Brookhaven Natl Lab, Upton, NY, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **MAG-17**: No. 5, 2144-2145(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

Design and performance data of a shielded beam channel, pulsed magnetic septum magnet are presented. Simple construction, good field quality, extremely low stray field are the advantages of this type of deflecting magnet.

4304 Storage Rings

24194 **(FERMILAB-PUB—82/92) Stochastic stacking without filters.** Johnson, R.P.; Marriner, J. (Fermi National Accelerator Lab., Batavia, IL (USA)). Dec 1982. Contract AC02-76CH03000. 11p. (CONF-820997—3). NTIS, PC A02/MF A01. Order Number DE83004260.

From Workshop on beam cooling; Stoughton, WI, USA (9 Sep 1982).

The rate of accumulation of antiprotons is a critical factor in the design of p anti p colliders. A design of a system to accumulate higher anti p fluxes is presented here which is an alternative to the schemes used at the CERN AA and in the Fermilab Tevatron I design. Contrary to these stacking schemes, which use a system of notch filters to protect the dense core of antiprotons from the high power of the stack tail stochastic cooling, an eddy current shutter is used to protect the core in the region of the stack tail cooling kicker. Without filters one can have larger cooling bandwidths, better mixing for stochastic cooling, and easier operational criteria for the power amplifiers. In the case considered here a flux of 1.4 x 10^8 per sec is achieved with a 4 to 8 GHz bandwidth.

44 INSTRUMENTATION

4401 Radiation Instrumentation

REFER ALSO TO CITATION(S) 23587, 24324, 24369, 24586, 24732, 24733, 24735

24195 **(BNL—32603) Radioactively induced noise in gas-sampling uranium calorimeters.** Gordon, H.A.; Rehak, P. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 9p. (CONF-8210131—1). NTIS, PC A02/MF A01. Order Number DE83008581.

From Gas calorimetry workshop; Batavia, IL, USA (28 Oct 1982).

Portions are illegible in microfiche products.

The signal induced by radioactivity of a U^{238} absorber in a cell of a gas-sampling uranium calorimeter was studied. By means of Campbell's theorem, the levels of the radioactively induced noise in uranium gas-sampling calorimeters was calculated. It was shown that in order to obtain similar radioactive noise performance as U-liquid argon or U-scintillator combinations, the α-particles from the uranium must be stopped before entering the sensing volume of gas-uranium calorimeters.

24196 **(DOE/ER/40033—9) Performance of a high-pressure-hydrogen time-projection chamber.** Chapin, T.J.; Cool, R.L.; Goulianos, K.; Silverman, J.P.; Snow, G.R.; Sticker, H.; White, S.N.; Chou, Y.H. (Rockefeller Univ., New York (USA); Academia Sinica, Beijing (China). Inst. of High Energy Physics). 1981. Contract AC02-81ER40033. 16p. (CONF-810759—2). NTIS, PC A02/MF A01. Order Number DE82000665.

From Physics opportunities at ISABELLE summer workshop; Upton, NY, USA (20 Jul 1981).

We have been using a high pressure hydrogen filled timed projection chamber (TPC) in a Fermilab experiment (E-612) which is investigating the diffraction dissociation of photons on hydrogen, $\gamma p \rightarrow Xp$. In this paper we present details on construction and performance of the chamber and describe briefly the experiment for which it was designed. The chamber acts both as target and as track detector of recoil protons. It is used to measure the polar angle, θ, and dE/dx of protons with $10 < T < 50$ MeV and $45° < \theta < 90°$. The energy of protons is determined by stopping them in plastic scintillation counters located inside the high pressure vessel. The experiment is operating in Fermilab's tagging photon beam ($20 \leqq$ p/sub $\gamma / \leqq 170$ GeV/c) which provides a flux of 1 to 2 x 10^6 tagged photons per pulse with a momentum resolution of +-2%.

24197 **(DOE/EV/04326—4) In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.** Cohen, N. (New York Univ., NY (USA). Inst. of Environmental Medicine). 1982. Contract AC02-77EV04326. 111p. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

Separate abstracts were prepared for the seven papers and one appendix in this progress report from New York University Medical Center. (KRM)

24198 (HMI—373, pp 77-78) **Measurement of neutron multiplicity distributions with scintillator tank.** Ingold, G.; Jahnke, U.; Hilscher, D.; Holub, E.; Brandt, R.; Feige, G.; Jungclas, H.; Koop, E.; Schmidt, L. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24199 (HMI—373, pp 79-80) **Measurement of the scattering angle at the entrance of the magnetic spectrometer with a position-sensitive parallel-plate avalanche counter.** Lettau, H.; Bohlen, H.G.; Rossner, H.; von Oertzen, W.; Adamski, K. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24200 (HMI—373, pp 81) **Two-dimensional position-sensitive parallel-plate avalanche counter for the magnetic spectrometer.** Lettau, H.; Adamski, K. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24201 (HMI—373, pp 146-147) **Solid state nuclear track detectors (SSNTD).** Sermund, G.; Enge, W.; Siegmon, G.; Beaujean, R. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24202 (HMI—373, pp 153) **Spectroscopy of neutron-rich nuclei via particle-γ-coincidences with a magnetic spectrograph.** Bohn, H.; Faestermann, T.; Kienle, P.; Koenig, J.; Koerner, H.J.; Mayer, W.A.; Pereira, D.; Rehm, K.E.; Scheerer, H.J. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24203 **(INFN/TC—80/10) Comparison between LYRA and SAND code performance for the extrapolation of data from activation detectors used for determining spectra of acceleration neutrons.** Birattari, C.; Cesana, P.; Salomone, A. (Istituto Nazionale di Fisica Nucleare, Milan (Italy)). 26 Aug 1980. 20p. NTIS (US Sales Only), PC A02. Order Number DE82903236.

Paper copy only, copy does not permit microfiche production.

Mathematical descriptions are given of the LYRA and SAND programs which are then used to evaluate typical acceleration neutron spectra or various energy conditions of incident protons, bombardment materials, and angle of neutron emission. 16 references, 12 figures, 1 table.

24204 **(Juel-Spez—152) Improved program for the determination of neutron efficiency of large Self Powered Neutron Detectors taking into account charge carrier production in the insulator.** Meier, B.; Brixy, H. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung). May 1982. 74p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750129.

This paper presents a computer program for calculating the signal current of a large surface prompt-response self-powered neutron detector (SPND). The program is an improved version of a program developed by Al-Dabagh /2/, which was designed for calculating the current only from the emitter of a SPND. In addition to the emitter current the improved program calculates the insulator current and the collector current, and combines these three currents into a current for the complete detector. This detector current accounts for an electric potential inside the insulator and the balancing currents generated hereby. The basic theory and the organisation of the improved program is described in the paper, with a listing of the source program presented in the appendix. Calculations performed for 80 SPNDs show a significant contribution of the insulator to the detector current. The insulator current may exceed the current from a very thin emitter. This causes a depletion of electrons in the insulator and results in a positive potential. Nevertheless, the emitter thickness proves to be the more important design parameter. The components of the detector current due to Compton and Photoelectric effects as well as discrete and continuum radiations were determined in an investigation. The comparison with a measured value shows the computer program provides useful results, but even in the improved program some deficiencies are recognized. These are explained and estimated in the paper.

24205 **Improved stabilization scheme for computerized pulse-height analyzers.** Cohn, C.E. (Argonne National Lab., IL (USA). Applied Physics Div.). *Nuclear Instruments and Methods in Physics Research;* **201**: No. 2/3, 379-380(15 Oct 1982).

A stabilization scheme has been adapted from a 24-bit to a 16-bit computer. A precision pulse generator produces tagged reference pulses alternately of high and low amplitude. Gain and zero corrections are obtained from these and applied to each normal event. Provisions are made to make the system robust against pileup corruption of the reference pulses.

24206 **Detection of minimum ionizing particles with a charge coupled device.** Bross, A. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.). *Nuclear Instruments and Methods in Physics Research;* **201**: No. 2/3, 391-394(15 Oct 1982).

The detection of ionizing radiation using charge-coupled devices is discussed. Results using a Fairchild CCD area imager are presented and its limitations examined.

24207 **New gas mixture improves performance of ^{3}He neutron counters.** Kopp, M.K.; Valentine, K.H.; Christophorou, L.G.; Carter, J.G. (Oak Ridge National Lab., TN (USA)). *Nuclear Instruments and Methods in Physics Research;* **201**: No. 2/3, 395-401(15 Oct 1982).

Count-rate capability, spatial resolution, and photon discrimination of position-sensitive, proportional neutron counters were improved by using a detector gas mixture of 65% ^{3}He and 35% CF_4. These improvements, relative to previously used ^{3}He-Xe-CO_2 mixtures, were due to the larger electron drift velocity, greater stopping power for the protons and tritons of the ^{3}He(n,p) reaction, and smaller photon cross section of the He-CF_4 mixtures.

4402 Radiation Effects On Instrument Components, Instruments, Or Electronic Systems

24208 (HMI—373, pp 140) **Ion implantation in silicon.** Fahrner, W.R.; Neidig, A.; Voss, P. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

4403 Miscellaneous Instruments

REFER ALSO TO CITATION(S) 22974, 23882, 24144, 24155, 24214, 25278

24209 **(CONF-820839—7) Photoelectron spectrometer for high-resolution angular resolved studies.** Parr, A.C.; Southworth, S.H.; Dehmer, J.L.; Holland, D.M.P. (National Bureau of Standards, Washington, DC (USA). Synchrotron Ultraviolet Radiation Facility; Argonne National Lab., IL (USA); Maryland Univ., College Park (USA). Inst. for Physical Science and Technology). 1982. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83008687.

From International conference on X-ray and VUV synchrotron radiation instrumentation; Hamburg, F.R. Germany (9 Aug 1982).

We report on a new electron spectrometer system designed for use on storage-ring light sources. The system features a large (76 cm dia. x 92 cm long) triply magnetically shielded vacuum chamber and two 10.2 cm mean radius hemispherical electron-energy analyzers. One of the analyzers is fixed and the other is rotatable through about 150°. The chamber is pumped by a cryopump and a turbomolecular pump combination so as to enable experiments with a variety of gases under different conditions. The light detection includes both a direct beam monitor and polarization analyzer. The electron detection is accomplished with either a continuous-channel electron multiplier or with multichannel arrays used as area detectors.

24210 **Radiographic screen-film noise power spectrum: calibration and intercomparison.** Sandrik, J.M.; Wagner, R.F.; Hanson, K.M. (General Electric Company, Medical Systems Operations, Applied Sciences Laboratory, Milwaukee, Wisconsin 53201). *Applied Optics;* **21**: No. 19, 3597-3601(1 Oct 1982). Contract W-7405-ENG-36.

The magnitude of a measurement of the noise power spectrum (NPS) of a radiographic screen-film system is affected by the light-scattering properties of the film studied and the optical characteristics of the microdensitometer used to sample the image. To facilitate absolute NPS intercomparisons among laboratories, NPS in terms of instrument density must be converted to diffuse density. Conversion in terms of a Callier Q factor was found to be inadequate due to nonlinearity of the density response of the microdensitometer. By establishing instrument-to-diffuse density characteristic curves for the microdensitometers at two laboratories and correcting the NPS by the square of the slopes of these curves at the density of the image, good agreement was achieved for independent NPS measurements of a given film sample.

4404 Well Logging Instrumentation

REFER ALSO TO CITATION(S) 23882

45 EXPLOSIONS AND EXPLOSIVES

4501 Chemical

24211 **(LA—9620) Deflagration-to-detonation transition in PETN and HMX.** Dinegar, R.H. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 10p. NTIS, PC A02/MF A01. Order Number DE83009273.

The deflagration-to-detonation transition (DDT) can be made to occur in both PETN and HMX. The reaction is sensitive to the degree of subdivision and the compactness of the explosive in which the transition takes place. It apparently happens better with explosives of small specific surface loaded at low density. Experiments using thin metal shims between the donor and transition-explosive charges suggest that transition-explosive compression makes an important contribution to the DDT process.

24212 **(LA-UR—81-2737) Initiation of propagating detonations.** Mader, C.L. (Los Alamos National Lab., NM (USA)). 1981. Contract W-7405-ENG-36. 35p. (CONF-810874—2). NTIS, PC A03/MF A01. Order Number DE82000564.

From 8. international colloquium on gasdynamics of explosions and reactive systems; Minsk, USSR (23 Aug 1981).

Portions are illegible in microfiche products.

The initiation of propagating detonation in PBS 9404, PBX 9502, and X0219 by hemispheric intiators of PBX 9404, 1.8 g/cm^3-TATB, and X0351 is described numerically, using the two-dimensional Lagrangian code, 2DL, and the Forest Fire rate to describe the heterogeneous explosive shock initiation process. The initiation of propagating detonation in the insensitive explosive PBX 9502 by triple-shock-wave interaction from three initiators has been modeled using the three-dimensional, reactive, Eulerian hydrodynamicd code, 3DE.

24213 **(MHSMP—83-09) TATB interlaboratory sieving study.** Duncan, A.A. (Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)). Mar 1983. Contract AC04-76DP00487. 20p. NTIS, PC A02/MF A01. Order Number DE83007651.

Interlaboratory comparisons were made of sieving standard aminated TATB samples. Five samples each from two TATB lots were analyzed by five participating laboratories. Intralaboratory results were repeatable indicating acceptable individual laboratory procedures. The interlaboratory results for the percentage < 45 μm varied 8.6%. The most likely cause for the interlaboratory variation is the use of different sieve sets. When a correction factor is used for individual effective sieve aperture size the interlaboratory results varied only 0.7%.

24214 **(MHSMP—83-10) Velocity perturbation of a flyer approaching a rigid impermeable barrier and the transmitted pressure pulse.** Meyer, T.O. (Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)). Mar 1983. Contract AC04-76DP00487. 40p. NTIS, PC A03/MF A01. Order Number DE83007770.

The velocity of an electrically-driven Kapton flyer is measured with VISAR as it travels the length of a barrel closed by a clear PMMA window. Velocity perturbation effects (principally that of air compression) are evident. Flyers with a velocity comparable to those viewed through the clear window impact an aluminized window of PMMA. The particle velocity at the interface is measured with VISAR. Good correlation is found for the flyer velocity just after impact from clear PMMA window shots and the peak particle velocity of the aluminized PMMA interface. Current VISAR capabilities at Pantex are discussed.

24215 **(UCID—19735) High-energy propellant studies: introduction and overview.** Lee, E.L. (Lawrence Livermore National Lab., CA (USA)). 14 Feb 1983. Contract W-7405-ENG-48. 4p. NTIS, PC A02/MF A01. Order Number DE83008440.

Efforts in four main areas which have been carried out at LLNL in the last several years are described. These sections include the work on formulation and its relation to impact response; the studies using time resolved infrared radiometry to study shock reactions in propellants; work on modeling of response of porous beds to rapid gas compression; and work on modeling of shock reactions and reactive flow in both intact (as manufactured) and porous (damaged) propellants.

24216 **(UCID—19740) Analytical and experimental evaluation of a proposed self-forging fragment munition.** Tuft, D.B.; Folsom, E.N. (Lawrence Livermore National Lab., CA (USA)). 27 Dec 1982. Contract W-7405-ENG-48. 23p. NTIS, PC A02/MF A01. Order Number DE83009173.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Analytical and experimental tools have been used to study the formation of a proposed self-forging fragment projectile. The primary objective of this study is the determination of the interior and exterior shape of the fully formed fragment, and to determine if the fragment tumbles in flight. In addition, it is of interest to compare computer predictions to experimental results. An experiment was performed using high speed photography and high-energy flash x-ray radiography to study liner and case motion and projectile formation. Fabrication and assembly tolerances were closely controlled in an effort to eliminate tolerances as a possible source of fragment instability. X-ray film-density contours were analyzed to determine the fully formed fragment interior and exterior shape. Down-range yaw screens showed fragment tumbling in flight. The computed fragment shape was compared to experimental results and it was found that a retaining ring in the computational model near the liner periphery had a significant effect on the final computed fragment shape. With the retaining ring in the computational model and full two-way sliding between all material interfaces, the final computed fragment showed very good agreement with the experiment on both exterior and interior shapes.

24217 **(UCRL—53150) Study of premature explosions in artillery projectiles filled with Composition-B. Final report.** Sadik, S. (Lawrence Livermore National Lab., CA (USA)). 12 Jan 1983. Contract W-7405-ENG-48. 74p. NTIS, PC A04/MF A01. Order Number DE83009171.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Concern about premature explosions in artillery shells has increased with the advent of high-performance ballistic characteristics and the use of composition-B as the high-explosive fill. An effort in expanding the state of the art in artillery shell structural dynamics and its effects on premature explosions is described. Results are presented of calculations on the macroscopic state of stress and motion in various artillery projectiles, including the M437 (175 mm), M549 (155 mm), M107 (155 mm), and M795 (155 mm). The effect of conditions at the high explosive-steel case interface (unbonded and bonded) were examined to determine the gains derivable from bonding this interface. These dynamic simulations included a detailed examination of the effects of Coulomb friction for both normal and abnormal loading conditions. Also, the effects of erratic propellant burns, environmental conditioning, and various aspects of gun launch loads are presented. It is shown that structural response is strongly affected by whether or not the projectile has a rocket-assisted configuration.

24218 **(UCRL—53393) Shaped-charge penetration in concrete: a unified approach.** Murphy, M.J. (Lawrence Livermore National Lab., CA (USA)). 14 Jan 1983. Contract W-7405-ENG-48. 135p. NTIS, PC A07/MF A01. Order Number DE83009181.

Portions are illegible in microfiche products. Original copy available until stock is exhausted. Thesis.

A unified anlaytical approach to the solution of the shaped-charge penetration in concrete problem has been developed and is

presented. The analytical model is correlated to three types of experiments that study the shaped-charge jet-formation process and resulting penetration phenomena. Hydrodynamic finite-element analysis of the explosive detonation, liner collapse, and jet-formation process is compared to a flash x-ray experiment of the jet at 30, 35, 45, 60, and 90 μsec. Analytical predictions of the penetration-time history are compared to experiments where the penetration-time history is monitored. These experiments provide for a determination of the minmum jet velocity for penetration as a function of standoff. Finally, computer predictions of total penetration and hole profile are comparied to experiments. These correlations provide for a determination of the jet-energy/target-hole-volume constant. The applicability of the computer model is shown by correlation to three sets of additional experimental data where the liner angle, liner thickness, and explosive type are varied. The variations in the shaped-charge design which were studied are specified. The method developed has been shown to be valid for a broad range of shaped-charge designs in concrete targets. Preliminary investigations, with other target materials show the method can be extended to a generalized shaped-charge design into any target as long as some basic target-material properties are known.

4502 Nuclear

REFER ALSO TO CITATION(S) 25282

24219 **(ALO—1983) Long-range Rocky Flats utilization study.** (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Feb 1983. 121p. NTIS, PC A06/MF A01. Order Number DE83009282.

Portions are illegible in microfiche products.

The purpose of this Study was to provide information concerning the Rocky Flats Plant and its operations that will be useful to the Nation's decision-makers in determining the long-range future of the Plant. This Study was conducted under the premise that national defense policy must be supported and, accordingly, the capabilities at Rocky Flats must be maintained there or at some other location(s). The Study, therefore, makes no attempt to speculate on how possible future changes in national defense policy might affect decisions regarding the utilization of Rocky Flats. Factors pertinent to decisions regarding Rocky Flats, which are included in the Study, are: physical condition of the Plant and its vulnerabilities to natural phenomena; risks associated with plutonium to Plant workers and the public posed by postulated natural phenomena and operational accidents; identification of alternative actions regarding the future use of the Rocky Flats Plant with associated costs and time scales; local socioeconomic impacts if Rocky Flats operations were relocated; and potential for other uses if Rocky Flats facilities were vacated. The results of the tasks performed in support of this Study are summarized in the context of these five factors.

24220 **(UCID—19305) Yield determination using long-wavelength black-body radiation from an underground nuclear explosion.** Rodgers, P.W.; Didwall, E.M. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 40p. NTIS, PC A03/MF A01. Order Number DE83008419.

A proposal is made to determine the yield, and possibly the temperature, of an underground nuclear explosion (UNE) by measuring the postshot long wavelength black body radiation propagating through the rock surrounding the cavity. Two cases of possible physical situations are presented; one is a favorable case and the other is a worst case. The results show that in the favorable case, it is possible to detect this radiation at very close observation points of 1 to 2 m from the cavity wall. Experimental conditions would be difficult, but several antenna configurations are suggested which are probably survivable throughout the experiment. A number of experimental field configurations for an add-on experiment are presented.

4503 Explosion Detection

24221 **(AD-A—120701/8) Investigations of near-source structural effects on body waves. Part II. Yucca Flats; receiver functions appropriate to NTS; motive functional specifications. Annual technical report.** Mellman, G.R.; Hart, R.S.; Lundquist, G.M.; Hadley, D.M. (Sierra Geophysics, Inc., Redmond, WA (USA)). 1982. 68p. NTIS, PC A04/MF A01.

This annual technical report includes a detailed report on near-source structural effects on the propagation of body waves at Yucca Flats, NTS. This study was an attempt to utilize Kirchhoff integral techniques to model the structural interactions at Yucca Flats and to thus examine the question of whether the observed magnitude residuals can be completely explained by interactions with structure. The analysis determined that the general trend and the maximum amplitudes of the observed magnitude residuals can indeed be produced by the assumed structure. Variances with the observed magnitude residual patterns do exist in the detailed aspects, however. These variances may result from either inadequacies of the structural model or limitations of the Kirchhoff approximation. Insufficient information is currently on hand to distinguish between those possibilities. In addition, this report contains summaries of NTS receiver function determinations and progress on development of the MOTIVE moment tensor analysis package. Details on both of those studies are contained in separate, previously submitted VSC technical reports.

24222 **(AD-A—121241/4) Seismic discrimination. Semiannual technical sumMary report no. 36, 1 Oct 81-31 mar 82.** Chinnery, M.A. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). 31 Mar 1982. 41p. NTIS, PC A03/MF A01.

This Semiannual Technical Summary describes the Lincoln Laboratory Vela Uniform program for the period 1 October 1981 through 31 March 1982. During this period, the Lincoln prototype Seismic Data Center has been refined and improved, prior to its transfer to its operational site at Roaslyn, Virginia. Section I describes these improvements. Section II describes a series of miscellaneous investigations.

24223 **(AD-A—951840/8) Relationship of body and surface wave magnitudes for small earthquakes and explosions. Scientific report.** Lambert, D.G.; Alexander, S.S. (Teledyne Geotech, Alexandria, VA (USA)). 12 Aug 1971. 67p. NTIS, PC A04/MF A01.

No abstract available.

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC

5001 Basic Studies

REFER ALSO TO CITATION(S) 23830, 23832, 23833, 24234, 24306

24224 **(EPRI-EA—1914-Vol.2) Precipitation-scavenging chemistry for sulfate and nitrate from the SURE and related data. Volume 2. Final report.** Hidy, G.M.; Countess, R.; Collins, H.; Machiraju, S. (Environmental Research and Technology, Inc., Westlake Village, CA (USA)). Feb 1983. 59p. NTIS, PC A04/MF A01. Order Number DE83901835.

Portions are illegible in microfiche products.

Parallel ground-based observations of ambient aerosol chemistry and precipitation water chemistry from samples taken at rural sites in the northeastern United States offer opportunities for elucidation of the wet deposition process. Data taken between 1978 and 1979 were selected and analyzed to estimate Junge's rainout efficiencies for sulfur oxides and nitrogen oxides, which are directly related to washout ratios. Calculations indicate that the mean rainout efficiency for particulate sulfate based on 500 samples is approximately 0.6 to 0.8. This is a necessary, but not a sufficient condition that particulate matter scavenging can account for most of the sulfate in precipitation water. Additional chemical data were

used to infer that significant acid production may take place in precipitation by SO_2 absorption and oxidation at some locations, particularly in Ohio and northeastward. In contrast with sulfate, the calculations indicate that nitrate is dominated by scavenging of gases, such as HNO_3, NO_2 or N_2O_5, rather than particles. The rainout efficiencies tend to be smaller in winter, and are largely independent of the phase of precipitation elements, and storm conditions. There is also a tendency for the rainout efficiencies to decrease with precipitation intensity. Supplemental results are included which illustrate the informational value in combined aerosol and precipitation water data which include both cation and anion chemistry. These data are useful in testing hypotheses about the enrichment mechanisms of hydrogen ions, sulfate and nitrate in precipitation relative to the ambient air. Examples show that the precipitation acidity is dominated by scavenging of sulfuric acid or aqueous SO_2 absorption followed by oxidation rather than HNO_3 scavenging.

24225 **(EPRI-EA—2243) Survey of plume models for atmospheric application.** Liu, M.K.; Moore, G.E.; Holman, H.Y. (Systems Applications, Inc., San Rafael, CA (USA)). Feb 1982. 145p. NTIS, PC A07/MF A01. Order Number DE83901850.

Portions are illegible in microfiche products.

This study was carried out as part of an effort to evaluate existing atmospheric plume models designed to estimate air-quality impacts from elevated point sources and to select a few representative models from numerous plume models currently available. On the basis of a set of criteria dictating the specific needs of the utility industry, 30 existing plume models, consisting of 19 kinematic models, 9 first-order-closure models, and 2 second-order-closure models were identified and analyzed. The model formulation and the technical attributes of each of the 30 plume models are compared and examined for differences and similarities. When appropriate, the operational and legal status of each of the plume models are also discussed. This information then provided the basis for the selection of a subset of plume models for further analysis or application. Four Gaussian plume models, three first-order-closure models and one second-order-closure model have been selected for extensive operational and diagnostic validation using the comprehensive data bases which are being assembled under the Plume Model Validation project.

24226 **Seasonal patterns of sulfate and nitrate in precipitation in the United States. Paper 81.6.1.** Bowersox, V.C.; Stensland, G.J. (Ill State Water Surv, Champaign, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

Studies of the cycles in precipitation of sulfur and nitrogen componds such as SO/sub 4/, NO/sub 3/, and H/sub 3/O, as well as the variations of air quality were conducted. Several maps are presented illustrating the patterns of the sulfur and nitrogen cycles in the troposhere. 20 refs.

5002 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 22945, 22946, 22952, 22953, 22954, 22958, 22959, 22961, 23008, 23067, 23068, 23069, 23070, 23071, 23830, 24051, 24224, 24225, 24226, 24254, 24280, 24281, 24288, 24302, 24362, 24400, 24401, 24409

24227 **(ANL/NESC—787) ATM; atmospheric transport & diffusion model.** Culkowski, W.M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048787.

Current storage allocation of the program allows maxima of 10 receptor points, 14 time periods, 10 each of point, area, and line sources, 5 pollutants The wind rose data must have 16 directions, a maximum of 7 stabilities, and a maximum of 8 wind speeds.

ATM can be used to estimate the transport of a pollutant from an emitting source to some receptor point. It is based on a Gaussian plume model and is capable of calculating wet and dry deposition and air concentration of non-radioactive pollutants at various receptor points located within 50 kilometers of a source or sources. The model can treat point, area, and line sources, including wind blown sources. The use of either the Pasquill-Gifford or the Briggs-Smith dispersion parameters can be specified.IBM360,370; FORTRAN IV (96%) and BAL (4%); OS/360,370; 210K bytes of storage are used with a unit for input and output printer and punch units.

24228 **(ANL/NESC—788) SULCAL; model of sulfur chemistry in a plume.** Baes, C.F. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048788.

SULCAL models the chemical reactions of sulfur species in the plume of a fossil fuel power plant, their transport through the atmosphere and deposition on the land surface. The model employs averaged concentrations based on the Gaussian plume and can calculate deposition rates for gaseous and particulate material as a function of such variables as distance from the source, wind speed, meteorological stability class, temperature, relative humidity, and the ambient concentrations of OH radical, ozone, and ammonia.IBM360,370; FORTRAN IV; OS/360,370; 76K of memory is required along with input and output units.

24229 **(BMFT-FB-HA—80-033) Development of dry-filter dust extractors to reduce dust development during operation of heading machines.** Bormann, R. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Aug 1980. 179p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750351.

Portions are illegible in microfiche products.

The progressing mechanization of operations in headings causes considerable increases in dust concentrations. These can be suppressed effectively only by the employment of high-efficiency dust exhaustion systems. Compared with the conventional high-efficiency wet dust extractor has a higher degree of efficiency and requires less energy and maintenance. The project aims at developing dry-filter dust extractors with low dimensions and insensitive against high air moistures. Based on known dry-filter dust extractors, the new designs were developed to a stage where they comply with the aforementioned demands after suitable tests at the surface and in actual headings underground with part-face and full-face attacking heading machines and improve, beyond that, the ergonomical conditions in headings by a better mine climate and by reducing the noise levels.

24230 **(CONF-810296—1) Wet and dry surface deposition of air pollutants and their modeling.** Hicks, B.B. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83008646.

From Meeting on conservation of historic stone buildings and monuments; Washington, DC, USA (2 Feb 1981).

The net rate of delivery of trace gases to receptor surfaces is largely determined by the chemical affinity of surface materials for the gas in question; if molecules of the gas are captured efficiently or react quickly upon contact with the surface, then high surface flux densities can be expected. Large particles are deposited by gravitational settling and by inertial impaction; the efficiency of their capture depends on their shape and the structure and orientation of the surface at the point of impact. small, sub-micron particles have difficulty penetrating the quasi-laminar air layer adjacent to smooth surfaces, but once they contact the surface they are efficiently retained by van der Waals forces. All particles are susceptible to electrostatic forces that will encourage deposition if either the particles or the receptor surfaces carry an electrical charge. The presence of temperature and humidity gradients near the surface can also promote or hinder the deposition of particles. Most of these matters have been investigated in studies of deposition to relatively uniform surfaces of pipes or plates in wind tunnels. Extrapolation to the real world case of complicated surface shapes is sufficiently uncertain that quantitative statements cannot be made. The role of rainfall and other kinds of atmospheric precipitation is equally complicated. Current ecological concern about the acidity of rain has focused attention on adverse effects associated with pre-

cipitation chemistry, but it must be recognized that rainfall provides a natural cleansing mechanism in many instances. In highly polluted areas, the major effect of rainfall might be to remove some previously deposited pollutants from exposed surfaces and to promote the subsequent deposition of soluble gases and small particles to those areas (such as crevices) which remain moist.

24231 **(CONF-820101—6) Intercomparison of MAP3S models of long-range transport and deposition.** Shannon, J.D.; Kleinman, L.; Benkovitz, C.; Berkowitz, C. (Argonne National Lab., IL (USA); Brookhaven National Lab., Upton, NY (USA); Battelle Pacific Northwest Labs., Richland, WA (USA)). 1982. Contract W-31-109-ENG-38. 5p. NTIS MF A01. Order Number DE83008618.

From 3. joint conference on applications of air pollution meteorology; San Antonio, TX, USA (11 Jan 1982).

Microfiche only, copy does not permit paper copy reproduction.

The Multistate Atmospheric Power Production Pollution Study (MAP3S), begun in the mid-1970's under Department of Energy sponsorship and continued with support from the Environmental Protection Agency, was designed to investigate the long-range transport and deposition of sulfur pollutants from utility coal combustion, but the scope has been broadened to acidic depositions from all sources. The bulk of the numerical model research has been conducted by groups at three of the national laboratories; Argonne (ANL), Brookhaven (BNL), and Battelle Pacific Northwest (PNL). This report addresses an intercomparison with data of the Atmospheric Impact of Residual Sulfur OXide (AIRSOX) model of BNL, the Regional Air Pollutant Transport (RAPT) model of PNL, and the Advanced Statistical Trajectory Regional Air Pollution (ASTRAP) model of ANL. AIRSOX and RAPT model individual trajectories, while ASTRAP models trajectory ensembles. Parameterizations are summarized. The models are structured so that they apply to any pollution in which chemical transformation can be approximated as linear first-order; in the intercomparison, however, only sulfur oxides were examined.

24232 **(DOE/ET/03425—19) Balance of the tropospheric ozone and its relation to stratospheric intrusions indicated by cosmogenic radionuclides. Technical progress report, November 1, 1979-June 30, 1980.** Reiter, R.; Kanter, H.J.; Sladkovic, R.; Jaeger, H.; Munzert, K.H. (Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Garmisch-Partenkirchen (Germany, F.R.). Inst. fuer Atmosphaerische Umweltforschung). Jul 1980. Contract AC02-76EV03425. 55p. NTIS, PC A04/MF A01. Order Number DE83009158.

Portions are illegible in microfiche products.

The balance of the tropospheric ozone is investigated considering the ozone sources with emphasis on tropospheric pollutants and stratospheric-tropospheric exchange processes. The measuring series of ozone concentration from the years 1977-1979 obtained at three different levels of the boundary layer (700, 1800, and 3000 m a.s.l.) have been analyzed. the data have been evaluated in correlation with relevant meteorological parameters, for instance solar radiation. For the different levels various types of ozone sources must be assumed. At the mountain stations prevails influx of stratospheric ozone. In the valley, however, photochemical production must be regarded as main source. A systematic study of ozone profiles obtained by balloon sondes revealed that as a rule after solar flares associated with Forbush effect drastic changes of the ozone profile take place in the lower stratosphere. Then, extremely high maxima of the ozone partial pressure are observed immediately above the tropopause and also intensive influxes of tropospheric air into the stratosphere between 200 and 100 mb. Effects of a modified lidar system on measurements of stratospheric aerosol layers and necessary corrections in evaluating the backscatter profiles are discussed and most recent measuring rresults presented.

24233 **(DOE/TIC—3382-R1) Carbon dioxide and climate. A bibliography.** Ringe, A.C. (ed.). (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). Sep 1981. 171p. NTIS, PC A08/MF A01. Order Number DE83009154.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This updated bibliography with abstracts presents 667 citations retrieved from the Energy Data Base of the Department of Energy Technical Information Center, Oak Ridge, Tennessee. The citations cover all aspects of the climatic effects of carbon dioxide emissions to the atmosphere. These include carbon cycling, temperature effects, carbon dioxide control technologies, paleoclimatology, carbon dioxide sources and sinks, mathematical models, energy policies, greenhouse effect, and the role of the oceans and terrestrial forests.

24234 **(DP—1639) Two-dimensional dynamical drainage-flow model with Monte Carlo transport and diffusion calculations.** Garrett, A.J.; Smith, F.G. III. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). Sep 1982. Contract AC09-76SR00001. 67p. (ASCOT—82-6). NTIS, PC A04/MF A01. Order Number DE83009386.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A simplified drainage flow model was developed from the equations of motion and the mass continuity equation in a terrain-following coordinate system. The equations were reduced to a two-dimensional system by vertically integrating over the drainage layer. A numerical solution for the drainage layer depth and wind field was obtained using a fourth order finite difference scheme. A Monte Carlo simulation was used to calculate the transport and diffusion of tracer gases. Model simulations of drainage flow have been compared to observations from the 1980 Geysers area experiments. The Geysers area is mountainous, with steep slopes, some of which are steeper than 10°. The model predictions of wind direction are good, but with speeds are not predicted as accurately. Simulation of perfluorocarbon tracer concentrations were in good agreement with observed values. Maximum tracer concentration was predicted to within a factor of five. While predicted plume arrival was somewhat early, the model closely predicted the duration of the passage for plume concentrations greater than 0.5 ppt. The two-dimensional model was found to work equally well in simulating drainage flows over the Savannah River Plant (SRP) and surrounding terrain with slopes of around 1°. The model correctly predicted that drainage winds at SRP are usually shallower than 60 m, which is the height at which meteorological towers measure the winds in the SRP production areas. The modest computational requirements of the model make it suitable for use in screening potential industrial sites.

24235 (EPRI-EA—2827, pp 2.1-2.31) **Wet and dry deposition into Adirondack watersheds.** Altwicker, E.R.; Johannes, A.H. (Rensselaer Polytechnic Inst., Troy, NY). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

Since May 1978, atmospheric inputs have been measured in three remote watersheds in the Adirondack Park of New York State. The three watersheds - Woods, Panther, and Sagamore - are located within 30 km of one another, near Old Forge, New York. Atmospheric inputs in the form of rain and snow have been obtained at 4 to 7 sites within these watersheds on an event basis (defined as daily collection). This paper gives an overview of the data base for a period somewhat in excess of two years, analyzes specific seasonal occurrences, types of precipitation, and briefly compares the results to relevant measurements from other networks (such as those reported by the MAP3S-stations in New York State, Ithaca and Whiteface, as well as SURE ambient air quality results). The emphasis in this paper will be placed on the major ions: hydrogen, sulfate, nitrate, ammonium, and calcium.

24236 (EPRI-EA—2827, pp 3.1-3.36) **Analysis of throughfall data and comparison of throughfall sampling procedures.** Vasudevan, C.; Clesceri, N.L. (Rensselaer Polytechnic Inst., Troy, NY). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

Precipitation is recognized as an important source of ions to a watershed. Precipitation over a forested watershed is altered by a brief but significant interaction with plant surfaces, which act as filtering mechanisms of airborne gases and particles. This results in a major transfer to the forest floor of materials captured, washed and leached from the forest canopy. The main objectives of this paper are threefold: to understand the importance of change in throughfall chemistry of various species of vegetation by comparing throughfall with wetfall and totalfall; to design a suitable throughfall sampling procedure; and to analyze throughfall data for the period November 1979 to March 1980.

24237 **(EPRI-EA—2889) Inventory of acid-deposition research projects funded by the private sector. Final report.** Kinsman, J.D.; Wisniewski, J. (General Research Corp., McLean, VA (USA)). Feb 1983. 343p. NTIS, PC A15/MF A01. Order Number DE83901869.

This document contains a description of acid-deposition-related research projects funded by the private sector during 1980, 1981 and 1982. The projects listed are either being performed internally by the particular entity or contracted out to universities, private firms, etc. This is the first attempt at assembling an inventory of private sector-funded acid-deposition research. Some of the summaries are incomplete because all desired information was not available from the performing or sponsoring institutions. In addition, despite attempts to make this an exhaustive inventory, it is possible that a few projects have been overlooked. Finally, projects funded at less than $5000 were not included in this survey.

24238 **(NASA-CR—168747) Research in atmospheric chemistry and transport. Final report, 15 Sep 1978-14 Jan 1982.** Yung, Y.L. (California Inst. of Tech., Pasadena (USA)). Jan 1982. 26p. NTIS, PC A03/MF A01.

The carbon monoxide cycle was studied by incorporating the known CO sources and sinks in a tracer model which used the winds generated by a general circulation model. The photochemical production and loss terms, which depended on OH radical concentrations, were calculated in an interactive fashion. Comparison of the computed global distribution and seasonal variations of CO with observations was used to yield constraints on the distribution and magnitude of the sources and sinks of CO, and the abundance of OH radicals in the troposphere.

24239 **(NASA-TM—76652) Atmospheric cycles of nitrogen oxides and ammonia.** Bottger, A.; Ehhalt, D.H.; Gravenhorst, G. (National Aeronautics and Space Administration, Washington, DC (USA)). Dec 1981. 133p. NTIS, PC A07/MF A01.

Transl. into ENGLISH from Atmosphariche Kreislaufe von Stickoxiden und Ammoniak." Julich, (West Germany), Rept. JUL-1558, Kernforschungsanlage, Nov. 1978 p 1-164 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prepared by Inst. for Chem. and Inst. for Atmospheric Chem.

The atmospheric cycles of nitrogenous trace compounds for the Northern and Southern Hemispheres are discussed. Source strengths and destruction rates for the nitrogen oxides: NO, NO_2 and HNO_3 -(NOx) and ammonia (NH_3) are given as a function of latitude over continents and oceans. The global amounts of NOx-N and NH_3-N produced annually in the period 1950 to 1975 (34 + 5 x one trillion g NOx-N/yr and 29 + or - 6 x one trillion g NH3-N/yr) are much less than previously assumed. Globally, natural and anthropogenic emissions are of similar magnitude. The NOx emission from anthropogenic sources is 1.5 times that from natural processes in the Northern Hemisphere, whereas in the Southern Hemisphere, it is a factor of 3 or 4 less. More than 80% of atmospheric ammonia seems to be derived from excrements of domestic animals, mostly by bulk deposition: 24 + or - 9 x one trillion g NO_3 -N/yr and 21 + or - 9 x one trillion g NH_4+-N/yr. Another fraction may be removed by absorption on vegetation and soils.

24240 **(NP—3770034) Air pollution by sulfur dioxide.** Schaerer, B.; Beck, P.; Gregor, H.D.; Hasse, A.; Haug, N.; Joerss, K.E.; Klein, A.W.; Lange, M.; Lohrer, W.; Lentzen, F. (Umweltbundesamt, Berlin (Germany, F.R.)). 1980. 123p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83770034.

Portions are illegible in microfiche products.

An analysis of the origin of sulphur dioxide from various groups of sources is followed by a description of the dispersion of the pollutant, its partial transformation in the atmosphere as well as the effects of the pollution. This chapter is followed by a description of both the impact of the pollution on man, ecosystems and materials and of the relevant economic damages. The next chapter discusses political strategies and regulations for the reduction of SO_2 emissions and pollution which have been enacted either with direct respect to sulphur dioxide or become indirectly effective by means of measures for rational use of energy. Special emphasis is put on emission reduction technology and energy saving with respect to SO_2 reduction, since both aspects are regarded as the technological prerequisites for the enforcement of improvement measures. An emission forecasting for 1990 on the basis of a prediction of the development of energy production and consumption is followed by an estimate of costs for the introduction of flue gas desulphurization at power plants in the Federal Republic of Germany. The report concludes with an overview of relevant international activites as well as of pertinent research and development projects on sulphur dioxide of the Umweltbundesamt (Federal Environmental Agency).

24241 **(PB—83-146209) Flue gas desulfurization information system data base user's manual.** (PEDCo-Environmental, Inc., Cincinnati, OH (USA)). Oct 1982. 142p. NTIS, PC A07/MF A01.

This document was prepared to provide a guide to the use of the Flue Gas Desulfurization Information System (FGDIS), a collection of data base files stored at the National Computer Center (NCC), Research Triangle Park, North Carolina. Access to these files and manipulation of the data therein is accomplished via SYSTEM 2000, a general data base management system developed by INTEL Corporation and supported by the NCC Univac 1100 hardware. This manual describes the content and use of the FGDIS data. It also serves as a general guide and reference manual for the use of SYSTEM 2000 (and the Univac 1100) as it applies to the FGDIS.

24242 **(SAND—82-8894) Real-time total-mass analysis of particulates in the stack of an industrial power plant.** Wang, J.C.F.; Kee, B.F.; Linkins, D.W.; Lynch, R.W. (Sandia National Labs., Livermore, CA (USA); Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology). Feb 1983. Contract AC04-76DP00789. 27p. (TVA/PUB—83/29). NTIS, PC A03/MF A01. Order Number DE83008414.

A real-time particulate mass monitor was developed for operation in stack gas environments. It provides mass measurements of sampled particles in real time (response time less than a few seconds) without diluting or cooling the sampled gas. Measurement biases of the type encountered in conventional physical sampling techniques are minimized. The performance of a system prototype was tested in the laboratory and in the flue gas of a coal-fired power plant. Preliminary test results and operational experience for the prototype are reported.

24243 **(UCRL—53288) Effect of a two-dimensional obstacle on the dispersion of a heavier-than-air gas in an atmospheric boundary layer.** Sutton, S.B. (Lawrence Livermore National Lab., CA (USA)). May 1982. Contract W-7405-ENG-48. 214p. NTIS, PC A10/MF A01. Order Number DE82015994.

Portions are illegible in microfiche products; Thesis. Submitted to the Univ. of California, Davis.

The results of a combined numerical and experimental investigation of the effect of a two-dimensional obstacle on the dispersion of a heavier-than-air gas in an atmospheric boundary layer are presented. In the numerical analysis portion, the governing equations are developed and the numerical solution algorithm is discussed. In the experimental portion a rough well boundary layer, that simulated at atmospheric surface layer flow, was generated in a 21.3 m long wind tunnel having a cross-section of 1.18 m x 1.68 m at the test section. Profiles of the mean velocity and turbulent kinetic energy are presented for 10 longitudinal positions from 5 obstacle lengths upstream to 12 obstacle lengths downstream of the

leading edge of the obstacle. Results of a numerical simulation of the wind tunnel measurements are given showing the effect of turbulence model changes on the numerical solution and its comparison with measurements. Concentration results are presented for numerical simulations of dispersion in an atmospheric flow at an obstacle Reynolds number of 3.36 x 10^6, showing the effect of gas density, injection source location, and turbulence model changes on the cloud formation.

24244 **(UCRL—53311) Particle size for greatest penetration of HEPA filters - and their true efficiency.** da Roza, R.A. (Lawrence Livermore National Lab., CA (USA)). 1 Dec 1982. Contract W-7405-ENG-48. 17p. NTIS, PC A02/MF A01. Order Number DE83008439.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The particle size that most greatly penetrates a filter is a function of filter media construction, aerosol density, and air velocity. In this paper the published results of several experiments are compared with a modern filtration theory that predicts single-fiber efficiency and the particle size of maximum penetration. For high-efficiency particulate air (HEPA) filters used under design conditions this size is calculated to be 0.21 μm diam. This is in good agreement with the experimental data. The penetration at 0.21 μm is calculated to be seven times greater than at the 0.3 μm used for testing HEPA filters. Several mechanisms by which filters may have a lower efficiency in use than when tested are discussed.

24245 **Environmental pollution control at the AMAX-Homestake lead smelter.** Kearney, W.M. (AMAX-Homestake Lead Tollers, Boss, MO); Gale, N.L.; Wixson, B.G. *Trace Substances in Environmental Health;* **15**: 350-355(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Since operations began in 1968, AMAX-Homestake and the University of Missouri-Rolla have cooperated to assess and monitor environmental impact of heavy metals in the vicinity of the lead smelter at Boss, Missouri. Installation of a number of pollution abatement practices and devices have significantly reduced dissemination of lead, zinc, copper and cadmium into the surrounding ecosystem. Fugitive emissions have been a major problem in the past and various control techniques using baghouses, wet scrubbers and an electrostatic precipitator have been employed with varying degrees of success. A redesigned material handling system is presently under construction to contain fugitive dusts associated with the return sinter crushing circuit. The new design will include total enclosure, dedicated baghouse collector and internal cleaning equipment. Sulfur dioxide has been controlled by a network of ambient monitors used to measure SO_2 concentration. Plant process emission control improvements have significantly reduced vegetation damage. Studies of metal concentrations in stream sediments and forest leaf litter over the past 12 years indicate a decrease in metal contamination of Crooked Creek and the surrounding forest as a result of alterations in wastewater treatment technology and stack emission controls. Core samples taken from wastewater impoundments indicate that the impoundments are performing an excellent job of trapping metal-rich materials associated with runoff from the smelter workyard. Historical trends and data from 1972 to present indicate a reduction in ambient air Pb concentrations at sampling stations downwind of the smelter. A reduction in Pb, Zn, Cu and Cd is also documented for decomposing leaf litter within a one-half to one-mile radius around the smelter. Studies are continuing to meet projected ambient air standards and to protect the environment.

24246 **State-of-the-art of commercially available personal monitors for NO/sub x/, SO_2 and particulate matter in ambient air.** Meranger, J.C. (Environmental Health Directorate, Ottawa, Ontario); Khan, T.R.; Caton, R.B. *Trace Substances in Environmental Health;* **15**: 406-418(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Commercially available personal monitors for the selected airborne pollutants NO/sub x/, SO_2 and respirable particulate have been reviewed. The study shows that there are no well-established devices available in the field. At the present stage of development NO/sub x/ and SO_2 passive monitors, permeation and diffusion-badge types, are strong contestants in the field with sensitivities close to 1/10 the threshold limit value (TLV). Their use is limited to temperatures above freezing point. Validation tests for long-term field operations are required to confirm manufacturers' performance claims. The study also reveals that there is an almost complete dearth of methodology. Personal monitors for particulate matter are at a developmental stage and are confined to active sampling devices. Teflon filter is the suitable medium for particulate sampling. Harvard/EPRI samplers appear to be suitable for this purpose, although some future verification of size fraction collected may be advisable. The feature which distinguishes this device from others is the unique air moving pump. Commercial instruments for in situ particulate mass determinations, either β-gauge or piezoelectric balance type, are not designed for personal monitoring. Besides being heavy (3 kg), their accuracy and precision are poor at levels approaching ambient ≦ 200 mg/m^3.

24247 **Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution.** Schwartz, S.E. (Brookhaven National Lab., Upton, NY); White, W.H. *Advances in Environmental Science and Engineering;* **4**: vp(1981). Contract AC02-76CH00016.

A mutually consistent set of free energies of formation has been presented for the gaseous species NO, NO_2, N_2O_2, N_2O_4, N_2O_5, HNO_2, and HNO_3, aqueous nitrous and nitric acid (in both ionized and nonionized forms) and water. Equilibrium constants are presented for gas-phase and mixed-phase reactions coupling these species. With the exception of reactions involving N_2O_5, which were not examined, comparisons with measured data indicate agreement generally within a few percent, although departure by as great as a factor of two was found in a few instances. Although comparatively little information is available concerning equilibria involving the aquated nitrogen oxides NO_2, N_2O_3, and N_2O_4, there is a rather high degree of consistency in these data. Examination of these equilibria has led to recommended values for the Henry's-law constants of these gases with uncertainties of 30 to 50%. Dissolution of NO_2 by reaction with O_2, O_3, or H_2O to form nitric acid is also considered. These reactions are characterized by large equilibrium constants and thus may be significant pathways for the reactive dissolution of NO_2.

5003 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 23187, 24052, 24244, 24359

24248 **(ANL/NESC—963) GASPAR; evaluation of atmospheric releases.** Eckerman, K.F. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048963.

Maxima of - 99 source terms 10 source terms in Cost Benefit Table 33 nuclides 5 individuals.

GASPAR implements the air released dose models of the NRC Regulatory Guide 1.109 for noble gases (semi-infinite plume only) and the radioiodine and particulate emissions (specifically 1.109-10 through 1.109-13 and a portion of 1.109-14). GASPAR computes both population (ALARA-As Low As Reasonably Achievable and NEPA-National Environmental Policy Act) and individual doses. Site data, meteorological data, radionuclide release source terms, and location meteorological data for selected individuals are specified as input data. The site data include population data and milk, meat, and vegetation production. The meteorological data include dispersion X/Q, X/Q decayed, X/Q decayed and depleted, and deposition. Population doses, individual doses, and cost benefit tables are calculated.IBM370,303x; FORTRAN IV (98%) and Assembly language (2%); OS/370; 270K bytes of memory are required for execution..

24249 **(NUREG/CR—1894) Mechanical-reliability evaluation of a proposed emergency-response radioiodine air sampler.** Krupa, J.F.; Bird, S.K.; Motes, B.G. (Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)). Dec 1982. Contract AC07-79ID01675. 69p. (ENICO—1075). NTIS, PC A04/ MF A01 - GPO. Order Number DE83008251.

In the event of environmental releases of radionuclides following an accident at a commercial nuclear power plant, the concentrations of the radionuclides must be determined to assess the potential radiological impacts. A prototype air sampler was developed to measure airborne radioiodine. An independent evaluation of the mechanical reliability of the air sampler was conducted to determine the effects of temperature, relative humidity, rainfall, dusty air, and mechanical treatment on the samplers performance. The air sampler motor exhibited an insufficient lifetime and would not operate reliably at low temperatures on direct current voltage. Brief scoping studies were conducted to identify candidate motors to replace the original air sampler motor.

24250 **Statistical performance of several mesoscale atmospheric dispersion models.** Weber, A.H.; Buckner, M.R.; Weber, J.H. (E. I. du Pont de Nemours & Co., Aiken, SC 29808). *Journal of Applied Meteorology;* **21**: No. 11, 1633-1644(Nov 1982). Contract AC09-76SR00001.

Seventeen mesoscale dispersion models were statistically evaluated with data from krypton-85 emissions from the Savannah River Plant, Aiken, SC. Widely accepted statistical parameters were used for the statistical evaluation. The models were able to predict concentration more accurately for longer periods of time (yearly) than for shorter periods (twice-daily). The correlations between predictions from different models were approximately the same as correlations between predictions and measurements.

24251 **Estimation of airborne and surface contamination resulting from the deposition-resuspension process.** Horst, T.W. (Pacific Northwest Lab., Richland, WA (USA)). *Health Physics;* **43**: No. 2, 269-272(Aug 1982).

This note points out the theoretical inadequacy of the resuspension factor model when estimating total radiation exposure following the atmospheric release of radioisotopes. It is indeterminate due to the lack of observational data on the effects of winds and weather, and it predicts the wrong dependence of resuspended contamination on the distance from the source. It is best applied only in the immediate vicinity of maximum surface contamination.

5004 Thermal Effluents Monitoring And Transport

REFER ALSO TO CITATION(S) 24250

24252 **(CONF-810545—7) Common problems in modeling of thermal plumes in air and water.** Policastro, A.J.; Dunn. W.E. (Argonne National Lab., IL (USA); Illinois Univ., Urbana (USA). Dept. of Mechanical and Industrial Engineering). 1981. Contract W-31-109-ENG-38. 15p. NTIS MF A01. Order Number DE83008512.

From 3. conference on waste heat management and utilization; Miami, FL, USA (12 May 1981).

Microfiche only, copy does not permit paper copy reproduction.

This paper identifies several important problems in the development of one-dimensional mathematical models for vapor plume dispersion and thermal discharges in water. One-dimensional integral models provide a reliable means of identifying modeling problems since they are relatively free of computational difficulties, rely on simple mixing relationships, are easy to use, and permit extensive model/data comparisons. In effect, the models for thermal discharges in water have the same fundamental problems as do the cooling tower plume models (difficulty with highly buoyant plumes, empirical treatment of simple boundary interferences, etc.) but to a lesser extent. However, surface discharge models suffer greater practical, site-specific problems (irregular bottom and shoreline, transient effects, etc.). The problems most common to cooling tower and thermal plume models relate to the treatment of buoyancy and the interaction with boundaries.

5005 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 23090

24253 **Spectral scales in the atmospheric boundary layer.** Weber, A.H.; Irwin, J.S.; Petersen, W.B.; Mathis, J.J. Jr.; Kahler, J.P. (E. I. du Pont de Nemours & Co., Aiken, SC 29808). *Journal of Applied Meteorology;* **21**: No. 11, 1622-1632(Nov 1982). Contract AC09-76SR00001.

Wind measurements from the Savannah River Laboratory-WJBF-TV tower in Beech Island, South Carolina were used to compute turbulence parameters which were then compared with similarity theory predictions summarized by Hanna (1981a). The parameters computed were standard deviations of the fluctuating velocity components σ/sub w/, σ/sub v/ and σ/sub w/, and spectral scales λ/sub m/ and l/sub E/. The correlation coefficients were highest for the standard deviations of the velocity components σ/sub u/, σ/sub v/ and σ/sub w/. The averaged correlation coefficients for all three components were 0.60, and 0.45 and 0.72 for unstable, stable and neutral conditions, respectively. The averaged correlation coefficients between computed and measured spectral maximum λ/sub m/u, λ/sub m/v and λ/sub m/w were 0.66 for stable conditions and 0.65 for neutral conditions. Very low correlations of -0.11 and 0.01 were obtained for λ/sub m/u and λ/sub m/v in unstable conditions. The vertical wavelength λ/sub m/w, however, had a correlation coefficient of 0.59 between measured and predicted values.

24254 **Visibility and the chemical composition of aerosols in air masses over Lake Michigan. Paper 81.21.5.** Alkezweeny, A.J.; Berkowitz, C.M. (Battelle, Pac Northwest Lab, Richland, WA, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

Measurement of reduced visibility, caused by interaction of light with aerosols and gases in the atmosphere, were made during summer of 1978 by an instrumented aircraft. The data collected are presented and results of a statistical analysis are discussed. It was concluded that the direction from which the air mass emanated can have a significant effect on correlation coefficents. The sulfate dominates light scattering in the urban plume, in contrast to rural air masses where nitrate is predominant. 5 refs.

5006 Regulations

REFER ALSO TO CITATION(S) 24302

24255 **(ANL/EES-TM—209) Analysis of proposed legislation to control acid rain.** Streets, D.G.; Conley, L.A.; Carter, L.D.; Vernet, J.E. (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 87p. NTIS, PC A05/MF A01. Order Number DE83008633.

This report reviews the activities of the 97th Congress of the United States related to the proposed establishment of an acid rain control program for the nation. Fourteen bills were introduced that address acid rain or the long-range transport of air pollutants. This report analyzes the emissions reductions and costs required by the five major bills: Mitchell (S. 1706), Moynihan (S. 1709), D'Amours (H.R. 4816), Moffett (H.R. 4829), and the Senate Committee (S. 3041). The emissions reductions range between 6.5 and 13.6 million tons of sulfur dioxide per year, at a cost of $2.6 to 5.4 billion per year. Impacts on specific midwestern states are discussed. In an appendix, the report reproduces copies of the five major bills referred to above.

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL

5102 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 24237, 24245, 24274, 24275, 24276, 24277, 24292, 24410

24256 (EPRI-EA—2827, pp 8.1-8.14) **Effects of simulated acid precipitation on carbon and nitrogen mineralization in soil.** Chang, F.H.; Klein, T.M.; Alexander, M. (Cornell Univ., Ithaca, NY). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

Soil organic matter plays an important role in influencing the physical and chemical properties of soils. It can improve soil physical properties by enhancing aggregation, reducing plasticity and increasing water-holding capacity. It controls the cation retention capacity and the availabiity of nutrients. Microorganisms are responsible for the decomposition of organic matter and are crucial to the turnover of nutrients in soils. In general, pH controls the type of microorganisms responsible for the carbon and nitrogen cycles. The objectives of this study were to determine the effects of acid precipitation on organic matter decomposition, the leaching of total organic carbon, nitrogen mineralization, and nitrification in three forest soils.

24257 **(PB—83-135400) Polycyclic aromatic hydrocarbons in Danish leafy crops. Part I: PAH in kale and beets relate to point sources of PAH. Part II: a survey of PAH in commercial grown fresh and deep-frozen kale.** Vahl, M.; Beck, J.; Stoebet, M. (Sentralinstitutt for Industriell Forskning, Oslo (Norway)). Jan 1982. 45p. NTIS, PC A03/MF A01.

Part I discusses the investigation of Polycyclic Aromatic Hydrocarbons (PAH) has been to demonstrate the possible pollution of leafy vegetables from expected PAH-emmissions, and to compare with similar investigations in Scandinavia. Part II is a survey has been to establish levels of PAH to which consumers are normally exposed from intake of fruits and above ground parts of vegetables.

24258 **(PB—83-138172) Industrial hygiene comprehensive survey. Solvent Refined coal pilot plant, Fort Lewis, Washington - a study of coal liquefaction processes. Final report.** (Enviro Control, Inc., Rockville, MD (USA)). Jul 1980. 118p. NTIS, PC A06/MF A01.

An industrial hygiene survey in a solvent refined coal pilot facility in Fort Lewis, Washington is described. The refining process, the facility, its work force, and the health and safety programs used by the facility are discussed. The sampling program, schedule, conditions, and results of the survey are described. Sampling of polynuclear-aromatics (PNA), aromatic amines, other organic, particulates, trace elements, and physical agent identified in the survey are discussed. The existing engineering control measures in the facilities are assessed. The authors conclude that the only potential hazard is the polynuclear aromatics, and they recommend that the process stream and the workplace environment be extensively studied, as well as the long term effects of PNAs.

24259 **Variability of mercury concentrations of midcontinent soils, USA; baseline data for a coal-fired power plant.** Barber, L.B. II; Steele, K.F. *Trace Substances in Environmental Health;* **15**: 317-322(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The possibility of coal-fired plants releasing hazardous quantities of mercury to the environment has been considered by other studies. These studies generally conclude that release of Hg by such plants is not a serious problem; however, most of the studies have not been compared against baseline data. A baseline study of Hg in soils within an 80 km radius of the Flint Creek power plant, Gentry, AR was conducted before the plant went into operation. This plant will release approximately 286 kg of Hg annually. If all this Hg is concentrated in the upper 2.54 cm of soil within the 80 km radius, values will be elevated by 0.003 ppM (8%) within 5 years. One hundred and twenty soil samples were collected and analyzed for Hg. Mean result of the analyses was -0.036 ppM Hg. For such a baseline study to be useful, all variables associated with the sample must be considered.

24260 **Cadmium and lead contaminated soils in some British metal mining areas.** Davies, B.E.; Ginnever, R.C.; Lear, J.M. (Univ. College of Wales, Aberystwyth). *Trace Substances in Environmental Health;* **15**: 323-332(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Previous work in this laboratory has shown that heavy metal contamination is commonplace in fields and gardens in areas where lead was once mined in Britain. Cadmium and Pb uptake by radish was investigated in field garden plots in northeast Wales (Halkyn Mountain), Derbyshire and the Mendips, including the village of Shipham. Here limestone is the host rock for mineralization and soils tend to have a near neutral reaction. Plots were also established in the non-limestone mining area of Ceredigion where soils are generally acid. The edible root of radish accumulated significant amounts of metals in each area. EDTA proved a useful extractant for estimating plant-available Cd and Pb. There was some evidence that increasing pH decreased the availability of Pb but the relationship for Cd was more complex being non-linear. The Halkyn area has the severest Pb problem and the Mendips the severest Cd problem.

5103 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 23096, 23148, 23167, 23185, 24362, 24474, 24475

24261 **(ANL/NESC—814) TRITMOD; advection model of tritium dispersion.** Murphy, C.E. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048814.

Steady-state conditions and radial geometry are assumed.

TRITMOD is a steady-state advection model of tritium dispersion and cycling in underlying vegetation and soil from an atmospheric point source. Radial geometry is assumed. Tritium is in both gaseous and water vapor form.IBM360; CSMP; OS/370.

24262 **(GSF-OE—609) Attempting a forecast on the future occurence of pollutants in food on the basis of today's and future production figures and patterns of application of chemicals.** Haag, M.; Korte, F. (Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.)). 1982. 278p. (In German). Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg, Germany, F.R.. Order Number DE83750144.

In order to achieve real trend forecasts a long-term observation of the contamination of certain foodstuffs within a defined local area in dependence of the topical emissions is required. It is necessary to select certain indicator substances which are persistent, which get into the environment by accident, which shall be produced and used in the long term, which can be determined as to their production quantity, which can be measured as to their emission into the environment, which are relevant as to their dimension, the physiological relevance of which justifies the expenditure, and the ecological metabolism of which should be known. Therefore the Institut fuer Oekologische Chemie had listed known concentrations of pollutants for the aquatic, non-marine sector. They were arranged according to substance groups, quantity and occurrence and thus a list of the contaminants of drinking water was made. Part two of the study presents three well-investigated compounds which can serve as indicator substances, i.e. cadmium, pentachlorophenol as well as polychlorinated biphenyls.

24283 **(GSF-R—289) Radionuclide migration of the elements I, Sr, Cs and Ce in subsurface loose rocks.** Klotz, D.; Lang, H.; Moser, H.; Behrens, H. (Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.). Inst. fuer Radiohydrometrie). Apr 1982. 84p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750305.

The investigations carried out at the Institute for Radiohydrometry of the GSF are used for the experimental acquisition of data to establish a diffusion model. This model describes the transport of radionuclides of the elements Ce, Cs, J and Sr with the gravitational and/or ground water in loose rocks from the area around Gorleben on water-unsaturated and water-saturated flow. The works comprise the determination of soil-mechanic characteristic values of the hydrodynamic flow parameters as well as of the retardation factors and diffusion coefficients. The investigations are carried out in the laboratory on natural loose rocks with specially mineralized water in column- and batch experiments.

24284 **(NUREG—0837-Vol.2-No.3) NRC TLD Direct Radiation-Monitoring Network. Progress report, July-September 1982.** Costello, F.; Thompson, T.; Cohen, L. (Nuclear Regulatory Commission, King of Prussia, PA (USA). Region I). Mar 1983. 195p. NTIS, PC A09/MF A01 - GPO $7.50. Order Number DE83901882.

This report is part of a continuing series providing data from the NRC's Thermoluminescent Dosimeter (TLD) Direct Radiation Monitoring Network. This report presents for the third quarter of 1982 the radiation exposure levels measured in the vicinities of NRC-licensed facilities throughout the country and includes facilities under construction as well as those which are in operation. A complete listing of the sites monitored is included. Each site is monitored by approximately 40 TLD stations located in concentric rings. The measured radiation levels are reported in units of milliroentgens. They are gross exposures and include exposures received while the dosimeters were in transit as well as exposures received in the field. Three sets of data are presented for each site. The first set includes the TLD station number, its direction and distance from the site, the integrated exposure for the period, and the exposure normalized to a ninety-day quarter (standard quarter). The second set of data summarizes in tabular form the average exposure measured in each of the sixteen standard windrose sectors around the facility and normalized to a standard quarter. The third set of data summarizes in tabular form the average exposure measured at three ranges of distances from the facility and normalized to a standard quarter.

24285 **(PB—83-145128) The Eastern Environmental Radiation Facility's participation in interlaboratory and intralaboratory comparisons of environmental sample analyses: 1979 and 1980. Final report.** Blanchard, R.; Broadway, J.; Moore, J. (Environmental Protection Agency, Montgomery, AL (USA). Eastern Environmental Radiation Facility). Jan 1982. 53p. NTIS, PC A04/MF A01.

Since 1964 the Eastern Environmental Radiation Facility (EERF), Office of Radiation Programs (ORP), U.S. Environmental Protection Agency, has compared its results of analyses of radionuclides in environmental and biological samples with those of other agencies. Such intercomparisons are sponsored by several agencies and the results are routinely published by the quality assurance reference center of the respective sponsoring agency. All samples in these intercomparisons are treated anonymously, identified by a code known only by the originating laboratory and appropriate reference center. This report presents our results for 1979 and 1980 in intercomparison studies sponsored by EMSL-LV, WHO, and the IAEA as well as our intralaboratory analyses results. The latter results include replicate, blind, and spiked sample analyses. The authors plan to publish similar reports on a biannual schedule.

5105 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 22964, 22965, 23092, 23186, 24309

24286 **(BNL—51634) 1982 breeding bird censuses and summary of 1977-1982 results.** Raynor, G.S. (Brookhaven National Lab., Upton, NY (USA)). Oct 1982. Contract AC02-76CH00016. 10p. NTIS, PC A02/MF A01. Order Number DE83008469.

As part of a program to characterize the plant and animal life of the Laboratory site and the surrounding region, the two breeding bird censuses originated in 1977 were continued in 1982. Coverage was slightly above average at BNL and somewhat below at Westhampton. Seventeen trips were made to the BNL plot and eleven to the Westhampton plot. Six observers censused the BNL and five the Westhampton plot. The number of species and of territorial males on the BNL plot declined only slightly from 1981 and was near the five-year 1977-1981 average. At Westhampton, the number of Rufous-sided Towhees declined somewhat from 1981, but the number of Prairie Warblers increased so that the total number of territorial males was nearly the same. A six-year summary is included.

24287 **(FWS/OBS—82/59) Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options.** Boesch, D.F. (ed.). (Louisiana Universities Marine Consortium, Chauvin (USA)). Sep 1982. 261p. (CONF-8110256—). USDI, Fish and Wildlife Service, Washington, DC 20240. Order Number DE83900897.

From Conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options; Baton Rouge, LA, USA (5 Oct 1981).

Sixteen papers and panel discussions from a conference held in Baton Rouge, LA, 5 to 6 October 1981 are presented. The presentations consider the causes and consequences of coastal erosion and wetland modification in Louisiana and the mitigative options available to slow or reverse the rapid rate of coastal land loss. Detailed habitat mapping studies have allowed accurate estimates of coastal habitat change and land loss through 1978. Projections from these rates of change indicate an annual rate of land loss in coastal Louisiana in the early 1980's of approximately 130 km^2/y (50 m^2/y). The projected effects of wetland modification on the bountiful living resources of coastal Louisiana (fisheries, fur and hide bearers and waterfowl) are major because of the close dependence of these resources on estuarine wetlands. These changes and others related to flood protection, transportation and ownership of mineral resources are projected to have extensive social and economic consequences. Options proposed to slow coastal land loss include major and minor diversions of the Mississippi River, barrier island and shoreline restoration and protection, hydrological management of wetlands and more restrictive permitting of dredging activities.

52 ENVIRONMENTAL SCIENCES, AQUATIC

5201 Basic Studies

REFER ALSO TO CITATION(S) 24350, 24351

24288 **(DOE/EV/05572—4) Fate of chlorine in seawater. Final report, August 1, 1977-January 31, 1981.** Wong, G.T.F. (Old Dominion Univ., Norfolk, VA (USA). Research Foundation). Nov 1982. Contract AS05-77EV05572. 117p. NTIS, PC A06/MF A01. Order Number DE83008963.

This study has been focused on two major areas: the effects of environmental variables on the rate and mechanisms of the dissipation of chlorine in seawater; and the analytical chemistry of residual chlorine in seawater. Results led to the study of a third area, the redox chemistry of seawater. The major accomplishments since the inception of this project are presented. The report is divided into three sections. The first section contains an introduction and a general summary of the activities and the highlights of the findings and conclusions drawn from this study. Section two contains re-

prints and preprints of published papers. Manuscripts that are in various stages of preparation are included in section three.

24269 **(DOE/NBB—0022) Possible changes in global sea level and their potential causes.** Barnett, T.P. (Scripps Institution of Oceanography, San Diego, CA (USA)). Nov 1982. Contract W-7405-ENG-48. 52p. NTIS, PC A04/MF A01. Order Number DE83008722.

A new analysis of global sea level has been made that largely avoids space/time bias of previous works. A coherent pattern of increasing relative sea level (RSL) was found to exist on average at all stations analyzed between 1903-1969. Subject to considerable assumption, the rate of RSL increase associate with this pattern was 15 cm/century. A similar analysis of the period 1930-1975 again showed RSL increasing everywhere but in the western half of the North Pacific Ocean. Decrease of RSL in this area is substantiated further by hydrographic data. Thus, in recent years, the concept of a global sea level rise is not supported. The temporal behavior of the near global signals from both time periods was well approximated by a simple linear trend. There was no evidence of a more rapid rise in RSL in recent years. Potential causes of the above RSL change were investigated.

24270 **(PNL—4527) Unsteady-flow model of Priest Rapids Dam releases at Hanford Reach, Columbia River, Washington.** Sneider, S.C.; Skaggs, R.L. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 59p. NTIS, PC A04/MF A01. Order Number DE83008426.

A model was developed to simulate water levels at three locations on the Columbia River between Priest Rapids Dam River Mile 396.1 (River Kilometer 639.0) and River Mile 361.50 (River Kilometer 581.7). The model was calibrated and verified over a range of flows. The results of calibration and verification indicate that the model, with reasonable accuracy, simulates stages to within +-0.08 m (+- 0.25 ft) and surface wave timing to within +-20 min. The model can be used by researchers, river system managers, planners, and decision makers as a tool to predict fluctuating water levels at locations downstream of dams. Data produced by the model can be used to evaluate and quantify possible impacts on aquatic organisms, water supply, navigation, irrigation, recreation, and additional hydropower enhancement. Although the results of this model calibrationand the model simulations presented are site-specific, the methodology is generic. Therefore, the model can be adapted to reflect dam discharges and resulting river flows at other river systems affected by water-level fluctuations.

24271 **(PNL-SA—8775) Existing programs, technology, and requirements relative to the conservation and protection of marine mammals in the US fishery conservation zone and in the southern ocean.** Eberhardt, L.L.; Hofman, R.J. (Pacific Northwest Lab., Richland, WA (USA)). Jul 1980. Contract AC06-76RL01830. 10p. NTIS, PC A02/MF A01. Order Number DE83002658.

Portions are illegible in microfiche products.

Meeting the intents and provisions of the Marine Mammal Protection Act depends on better assessment of the status, trends, and essential habitats of marine mammal populations and on determination of how these populations and habitats are being, or might be, affected by commercial hunting, subsistence hunting, offshore oil and gas development, etc. Programs responsive to these needs have been and are being developed by the responsible federal and state management agencies, but the effectiveness of the programs is being limited, in part, by the limited availability of ice-strengthened survey ships, long-range survey aircraft, and radio-tracking technology. We need, therefore, to (1) construct or modify an existing ship or ships for marine mammal survey in the Antarctic, the Arctic, and elsewhere; (2) construct or modify an existing aircraft to conduct effective and efficient long-range visual surveys of porpoise and other mammals in the Eastern Tropical Pacific and elsewhere; and (3) expedite efforts to develop a safe, reliable system for tracking marine mammals via ships, aircraft and, especially, satellite.

24272 **Origins of dissolved organic matter in Southern California coastal waters: experiments on the role of zooplankton.** Eppley, R.W. (Scripps Inst. of Oceanography, San Diego, La Jolla, CA); Horrigan, S.G.; Fuhrman, J.A.; Brooks, E.R.; Price, C.C.; Sellner, K. *Marine Ecology: Progress Series;* 6: 149-159(15 Oct 1981). Contract AM03-76SF00010.

The contribution of zooplankton to flows of dissolved organic carbon was studied for the food web of coastal plankton assemblages off Southern California, USA. Seawater samples including active macrozooplankton were labelled with $^{14}CO_2$. The time course of $^{14}CO_2$ incorporation into size fractions of the plankton and dissolved organic materials was determined. Changes in extracellular concentrations of free primary amines and dissolved saccharides were also measured. In addition, the time course of ^{3}H-thymidine incorporation into bacteria was determined along with bacterial cell counts. By comparing carbon flows in samples with macrozooplankton and without macrozooplankton, we evaluated the role of macrozooplankton in the flux of carbon to bacteria and dissolved organic matter. One-half or more of the ^{14}C-carbon in the bacterial size fraction could be due to small photosynthetic forms or the remains of microplankton disrupted by the filtration used in the size fractionation. Moreover, most of the carbon flowing to bacteria from the macrozooplankton was not labelled by ^{14}C and was proportional to the number of macrozooplankton. Conservative estimates of this unlabelled carbon flux to bacterial biomass due to macrozooplankton were 3 and 10% of the ^{14}C assimilated photosynthetically. Potential artefacts resulting from experimental manipulations are considered.

24273 **Multiphasic kinetics for D-glucose uptake by assemblages of natural marine bacteria.** Azam, F. (Scripps Inst. of Oceanography, San Diego, La Jolla, CA); Hodson, R.E. *Marine Ecology: Progress Series;* 6: 213-222(15 Oct 1981). Contract AM03-76SF00010.

D-Glucose-6-[^{3}H] uptake kinetics for marine microbial assemblages were multiphasic when the kinetics were determined over a broad concentration range (10^{-9}M to 10^{-3}M). Maximum uptake velocity (V/sub max/) and the sum of half saturation constant (K/sub t/) and ambient glucose concentration (S/sub n/), (K/sub t/ + S/sub n/), increased gradually as the range of glucose concentration was increased. In all seawater samples examined the lowest (K/sub t/ + S/sub n/) values were 2-5 x 10^{-9}M; highest values were as high as 5.9 x 10^{-4}M. Simple diffusion into algae or bacteria cannot explain the non-linearity of kinetics curves. Removal of most algal cells did not change the kinetic pattern, and indirect estimates of diffusion into bacteria were too small to have greatly changed the uptake in 1 x 10^{-9} - 1 x 10^{-5}M range of glucose. The kinetic diversity of marine bacterial assemblages has implications in the cycling of dissolved organic matter in the varied concentration regimes presumably present in production microzones. Turnover times of the glucose pool at elevated concentrations were in the order of 10^{1}-10^{3}h, suggesting that episodic high concentrations of substrate would diffuse out of the production microzones before significant uptake. Sustained concentration gradients might attract high K/sub t/ high V/sub max/ bacteria which might take up a significant fraction of substrate within the production zone. The observed kinetic diversity points to the need for a modified kinetic approach to account for the diversity of K/sub t/ and V/sub max/.

5202 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 22949, 22960, 22962, 22963, 23040, 23041, 23429, 24236, 24237, 24245, 24262, 24268, 24270, 24309, 24439, 24499, 24501

24274 **(ANL/NESC—789) ODMOD; soil-water trace-containment transport.** Larson, N.M.; Reeves, M. (Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048789.

Current storage allocation of the program allows maxima of 10 layers, 3 types of boundary conditions, 200 eigenvalues, 1000 time-steps, 21 spatial locations for output of results.

ODMOD is a transport model which predicts the coupled movement of both water and trace contaminants through a layered and unsaturated soil-moisture zone. In order to achieve computation speeds suitable for watershed implementations, moisture properties are approximated as exponential functions of pressure head, and lateral flows are treated as sinks in a basically vertical one-dimensional analysis. In addition, only advection by the Darcy-flow velocities and linear absorption by the soil-matrix are considered in depicting movement of the trace contaminant.IBM360,370; FORTRAN IV (97%) and BAL (3%); OS/360,370; Approximately 240K bytes of storage are required for execution.

24275 **(ANL/NESC—793) CHNSED; sediment & contaminant transport model.** Fields, D.E. (Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048793.

Current computer storage allocation allows a watershed to be divided into three segments while the channel system is broken down into seven separate reaches. Reference report, ORNL/NSF/EATC-19.

CHNSED is an expanded model of hydrologic response of a watershed. It includes the simulation of trace contaminant transport through the watershed. Within the stream channel system trace contaminant is transported in dissolved and adsorbed form. CHNSED includes both SEDTRN, a model of sediment transport through a rectangular stream channel system, and the Wisconsin Hydrologic Transport Model, WHTM (NESC Abstract 808), a processes model. Processes considered in CHNSED include particulate mobilization (sheet erosion and overland transport) and dissolved contaminant transport (associated with run off, interflow, and base flow inputs to the channel system). An ion exchange submodel simulates the soil-contaminant-water interaction at the land surface, and sediment transport and partitioning of trace contaminant between water and sediment in the channel system are also included. Following its entry into the channel system, dissolved contaminant transport is derived from flow routing algorithms of the WHTM. Routing of the adsorbed fraction is controlled by sediment transport dynamics, which are governed by bedload and suspended load sediment transport.IBM360,370; FORTRAN IV (96%) and BAL (4%); OS/360; 350K bytes of storage are required and FORTRAN logical units 1 through 4 are utilized for temporary files during problem execution.

24276 **(ANL/NESC—794) OPTRM; hydrologic transport with optimization.** Fields, D.E. (Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048794.

As currently structured, OPTRM optimizes a set of either six hydrologic response parameters or three contaminant transport-related values. OPTRM determines a set of parameters for a single segment of a watershed. Reference report, ORNL/NSF/EATC-14. A segment may be considered a normally homogeneous region of the watershed.

OPTRM is utilized to determine an optimal set of model parameters for the Wisconsin Hydrologic Transport Model, WHTM (NESC Abstract 808). An optimal set of parameters is defined as that set which gives in a mathematical sense the best simulation; i.e., which provides the best match on either a monthly or daily basis between observed outflows and simulated outflows. The term outflow applies here to either water or trace contaminant values.IBM360,370; FORTRAN IV (96%) and BAL (4%); OS/360; OPTRM utilizes an overlay structure requiring 290K bytes of storage. FORTRAN logical units 1 through 4, disk storage, are used as temporary files. The LAND and CHANL input are read from disk logical unit 5 with other input data read from unit 10. In addition to the print output on logical unit 15, units 6 and 13 are used for daily observed and simulated flow print and plot output.

24277 **(ANL/NESC—808) WHTM; Wisconsin hydrologic transport model.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Fields, D.E. (Union Carbide Corp., Oak Ridge, TN (USA). Computer Sciences Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048808.

Current version of the problem allows treatment of three land segments, seven reaches in the stream network, and one chemical element. The program has been used typically for 12-14 month simulations at one execution. Reference reports, ORNL-NSF-EATC-7 and ORNL/NSF/EATC-29.

WHTM is the Wisconsin Hydrologic Transport Model which treats the movement of water and trace amounts of chemicals from the place and time of introduction onto the land area segments of a watershed, through these segment vertical profiles to the water table or laterally to streams, and through the stream channel network to the watershed outfall. Overland and stream flow are governed by the Chezy-Manning equation. Trace chemical transport is represented by an ion-exchange model which uses a single distribution coefficient K(d) for each chemical species. Operation of the program requires historical hourly precipitation data and daily or monthly climatological data in addition to the parameters used to describe the watershed.IBM360,370; FORTRAN IV (96%) and Assembler (4%); OS/360 (IBM360), OS/370 (IBM370,3033); 410K bytes of storage are required for execution.

24278 **(DOE/EV/03292—3) Biogeochemistry of trace metals in Chesapeake Bay. Final report, April 1, 1981-March 31, 1982.** Gavis, J. (Johns Hopkins Univ., Shady Side, MD (USA). Chesapeake Bay Inst.). Mar 1983. Contract AC02-76EV03292. 33p. NTIS, PC A03/MF A01. Order Number DE83008371.

Portions are illegible in microfiche products.

Concentrations of dissolved orthophosphate and ammonia determined during a 43 hr period in the lower Potomac River estuary varied with depth and with time at any depth, but were independent of time when expressed as functions of salinity. The concentration/salinity profiles in the anoxic deep water could be described by the solution of a differential equation, which was obtained by transformation of the partial differential equations for transport of salt and of a non-conservative nutrient. The solution was expressed in terms of a dimensionless parameter, phi, equivalent to the ratio of a characteristic nutrient production rate to a characteristic nutrient diffusion rate. Estimates of phi, obtained by means of non-linear parameter analysis, were 1.13 for dissolved orthophosphate and 1.03 for ammonia. This means that about half of the nutrients in the anoxic deep water were produced in the water by anaerobic mineralization of detritus, and half were transported into the water with salt from higher salinity water down the estuary. Any nutrient flux from the bottom sediment was too small to be discerned relative to the nutrient produced in and transported through the water. The ammonia/dissolved orthophosphate concentration ratio in the anoxic water was 7 to 8, indicating that, because denitrification could not occur, a smaller fraction of bound amino-nitrogen than of bound phosphate was released by mineralization of detritus as it settled in the anoxic water.

24279 **(DOE/EV/10467—T1) Study of the physical-chemical mechanisms and variables which affect the transport of inorganic and organic microcontaminants in heterogeneous systems. Technical progress report, 1 July 1980-1 July 1983.** Anderson, M.A.; Tejedor-Tejedor, M.I.; Yast, E.C.; Hansmann, D.D.; Stanforth, R.R. (Wisconsin Univ., Madison (USA)). Jun 1983. Contract AC02-80EV10467. 111p. NTIS, PC A06/MF A01. Order Number DE83008991.

Portions are illegible in microfiche products.

In order to predict, in time and space, movement or attenuation of organic and inorganic solutes in heterogeneous subsurface environments, it is necessary to describe the dynamic interplay or competition that exists between aqueous solutions and solid surfaces for given solutes. Often, this competition ultimately determines the degrees of solute mobility. For transport modeling, competition is

expressed simply as retardation factors. This report essentially reviews results from the independent studies which have all been designed as research probes into the nature of interfacial reactions: (1) phenol adsorption onto goethite; (2) electrostatic contributions in protolyzable anion adsorption; and (3) the effect of chemical and physical coagulation on the uptake of phosphorus by goethite. These studies represent state of the art contributions to the total level of effort being made by the research community in a rapidly expanding attempt to understand the adsorption of trace contaminants in heterogeneous systems.

24280 (EPRI-EA—2827) **Integrated lake-watershed acidification study: proceedings of the ILWAS annual review conference.** (Tetra Tech, Inc., Lafayette, CA (USA)). Jan 1983. 315p. (CONF-8010319—). NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

The Integrated Lake-Watershed Acidification Study (ILWAS) was initiated in 1978, under sponsorship of the Electric Power Research Institute, Inc. (EPRI), to study and detail lake acidification processes for three lake watershed basins in the Adirondack Park region of New York. The three basins (Woods, Sagamore, and Panther) receive similar amounts of acid deposition yet have dissimilar lake water pH values, indicating unequal acid neutralizing capacities among the watersheds. This report contains a compilation of 14 papers presented by the ILWAS investigators at the Annual Review Meeting held at Sagamore Lake Conference Center October 1980. Relevant topics include: study overview; characterization of wet and dry deposition; evaluation of sampling methods for throughfall under various canopies; watershed soil structure, permeability, mineralogy, and aluminum dynamics; mineralization and decomposition attributed to microbial activity during acidification; lake water chemistry and analyses of processes leading to acidification of lake waters during spring snowmelt; sediment studies including an assessment of historical lake pH as determined by diatom analysis, levels of trace elements and PAHs; and effects of acidification on lead mobility in the sediment.

24281 (EPRI-EA—2827, pp 1.1-1.31) **Overview of the integrated lake-water acidification study (ILWAS).** Chen, C.W.; Gherini, S.A.; Dean, J.D.; Hudson, R.J.M. (Tetra Tech, Inc., Lafayette, CA). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

The Integrated Lake-Watershed Acidification Study (ILWAS) involves investigators of highly varied backgrounds, from seven universities, a national laboratory, a federal agency and a private research company. Robert Goldstein, on behalf of the sponsor, the Electric Power Research Institute (EPRI) has established a committee of technical advisors chosen from academia, private industry and government, and includes experts from foreign countries. As part of the study plan, meetings are held in which the technical advisors review the investigators activities and provide future guidance. These meetings have provided a means for exchange of information particularly during the informal topical workshops. New members have been added to the technical advisory committee. The sponsor (EPRI) has also supported projects complimentary to our study. The investigators associated with those projects will be presenting their studies at this year's fall meeting, along with the ILWAS investigators, so that their results can be integrated into the overall effort. This paper has been prepared to provide an overview of the ILWAS and to briefly summarize the findings to date. Progress reports, papers, abstracts and raw data from the investigative team have been drawn upon freely for these purposes.

24282 (EPRI-EA—2827, pp 4.1-4.27) **Distribution and characteristics of surficial geologic materials in the ILWAS watershed.** Newton, R.M. (Smith College, Northampton, MA). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

Surficial geologic mapping has identified four major lithostratigraphic units in the three ILWAS watersheds. These four units include an aeolian silt which mantles much of the watersheds; sparse areas of glaciofluvial sand; extensive areas of sandy till; and a few outcrops of a clay rich till underlying the sandy till (Figure 1). Characteristics of the units which have been determined include grain size, seismic velocity, thickness and permeability. In addition, the variation in mineralogic composition within each unit has been examined. The observed differences in surficial geologic materials in each of the three watersheds may account for the observed differences in lake water acidity.

24283 (EPRI-EA—2827, pp 7.1-7.14) **Aluminum dynamics in the ILWAS watersheds.** Schofield, C.L. (Cornell Univ., Ithaca, NY). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

Aluminum is abundantly present in acid soils as crystalline minerals, amorphous hydroxy-organic precipitates, and/or exchangeable ions. High concentrations of amorphous aluminum precipitates were found in the spodozol B horizons of the Integrated Lake-Watershed Acidification Study (ILWAS) watershed soils, but well crystallized hydroxides (e.g. gibbsite) were not detected. The more readily soluble amorphous $Al(OH)_3$ and exchangeable aluminum present in these soils are particularly susceptible to mobilization and transport in solution through soils and into streams and lakes by either strong mineral acids derived from atmospheric deposition or internally generated organic acids. The objectives of this effort are to determine the primary sources and mechanisms of aluminum mobilization in the ILWAS watersheds. The observed temporal and spatial changes in concentrations and distribution of aluminum species are discussed in this report in relation to hypothesized mechanisms controlling aluminum mobilization and transport.

24284 (EPRI-EA—2827, pp 9.1-9.18) **Allochthonous litter decomposition in three Adirondack lakes.** Francis, A.J.; Hendrey, G.R.; Quinby, H.L. (Brookhaven National Lab., Upton, NY). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

The objective of this study was to determine the effects of lake acidification on microbial colonization and decomposition of leaf litter in Woods, Sagamore and Panther lakes. Litter bags containing leaves of beech, sugar maple, red maple, leather leaf and red spruce were incubated at various depths in the lakes. Beech leaves were incubated at 1, 3 and 5 meter depths whereas sugar maple, red maple, leather leaf and red spruce were incubated at a depth of 1 meter. Samples of leaf packs were removed after 7, 21 and 220 days of incubation and analyzed for loss of weight, changes in lead surface area and bacterial populations. In addition, lipopolysaccharide contents of the leaves were determined to estimate the bacterial biomass colonizing the leaves. Water and sediment samples from all three lakes were also analyzed for populations of total bacteria, ammonia-oxidizing and nitrite-oxidizing bacteria, and lipopolysaccharide contents in all three lakes.

24285 (EPRI-EA—2827, pp 10.1-10.19) **Lake acidification during spring snowmelt: processes and causes.** Galloway, J.N. (Virginia Univ., Charlottesville); Schofield, C.L.; Hendrey, G.R.; Peters, N.E.; Johannes, A.H. Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

The acidification of lakes during spring snowmelt has been reported in the Adirondack Mountains of New York, in Norway, and in Sweden. It is reported that all three areas receive acidic atmospheric deposition, and the spring acidification of lakes has been said to be due to acid precipitation. Rosenquist et al. have hypothesized that the spring acidification of these lakes is caused by the

large natural source of acids in the surrounding soils. In late 1977, the Integrated Lake-Watershed Acidification Study (ILWAS) funded by the Electric Power Research Institute (EPRI), was begun to determine the processes which control the response of aquatic ecosystems to acid precipitation. As part of this study, the cause(s) of spring acidification of lakes were addressed. This manuscript reports the preliminary results of these studies. The ILWAS focuses on three lake-watershed systems that are hydrologically and chemically monitored.

24286 (EPRI-EA—2827, pp 11.1-11.7) **Summary of observations from the investigation of the sediments of Panther, Sagamore and Woods.** Galloway, J.N. (Virginia Univ., Charlottesville); Banning, D.; Del Prete, A.; Heit, M.; Davis, A.O. Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

The objective of the Integrated Lake-Watershed Acidification Study (ILWAS) is to determine why three lake-watershed systems respond differently to essentially equal inputs of acidic atmospheric deposition. The research approach is to first treat the systems as discrete entities by measuring inputs (atmospheric deposition) and outputs (lake discharge) and creating hypotheses to explain the system differences in the input-output relationships. Secondly, the different compartments of the system (canopy, soil, lake, lake sediment) are investigated separately to determine their influence on the net behavior of the total system. This paper introduces a collection of investigations on one compartment, the lake sediments and precedes a set of papers which highlight the historical trends and contemporary processes of the sediments. The results are, for the most part, preliminary and are used to guide future research in the area.

24287 (EPRI-EA—2827, pp 12.1-12.17) **Temporal trends in the pH of Woods, Sagamore, and Panther Lakes as determined by an analysis of diatom population.** Del Prete, A. (State Univ. of New York, Oswego); Galloway, J.N. Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

Dilute lakes, found in areas of hard, relatively insoluble bedrock, receive a major portion of their total ion supply from atmospheric precipitation. There exists a dynamic relationship between atmospheric and surface water chemistry. Anthropogenic modifications of atmospheric chemistry may be reflected in the chemical and biological composition of these lake systems. The atmospheric deposition of strong acids, present in precipitation falling over widespread areas of the northeastern United States has been identified as a source of acidity present in dilute lakes of the Adirondack Mountains of New York. The objective of the research reported herein was to determine if biological perturbations induced by lake acidification could be identified in lake sediment profiles. Biogeochemical changes with depth in lake sediment cores have previously been utilized as a record of historical events. In addition, paleolimnological analyses of lake sediments were employed in Scandanavia to specifically evaluate acidification effects on plankton communities. The latter study examined the diatom profile of sediments from an acidified Swedish lake and revealed that the frequency of diatom valves decreased markedly from older to more recent sediment layers. Comparable investigations had not been conducted in acidificed regions of North America. Our study was designed to provide data to evaluate the feasibility of this approach for investigating historical periods and rates of acidification in lakes of the Adirondack Mountains of New York.

24288 (EPRI-EA—2827, pp 13.1-13.12) **Trace element and polycyclic aromatic hydrocarbon levels in sediment cores from Sagamore and Woods Lakes.** Heit, M. (Dept. of Energy, New York, NY); Tan, Y.; Klusek, T.C.; Burke, J.C. Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

Among the pollutants released into the atmosphere during the combustion of fossil fuels are toxic and potentially toxic trace elements such as As, Cd, Hg, Se, Pb and Tl, and polycyclic aromatic hydrocarbons (PAHs) such as benzo(a)pyrene and benzo(a)anthracene which have been shown to be mutagenic or carcinogenic to many groups of biota including humans. The aim of this study was to determine to what degree these two classes of pollutants have been deposited in remote lakes which receive acid precipitation and to provide data on historical changes in the levels of these substances in the environment.

24289 (EPRI-EA—2827, pp 14.1-14.9) **Lake acidification: its effect on lead mobility in the sediment of two Adirondack lakes.** Davis, A.O. (Colorado Univ., Boulder); Galloway, J.N.; Nordstrom, D.K. Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

The atmospheric concentration of lead in the United States has increased over the past few decades due to anthropogenic activities. Consequently the rate of lead deposition from the atmosphere has also increased resulting in enhanced lead concentrations in the sediment of lakes downwind from anthropogenic activities. Lead deposited to the lake sediment may be mobilized due to the change of lake water chemistry. As the pH of a lake decreases, the potential for ion exchange, solubilization or desorption of metals, e.g. lead, from the sediment into the water column increases. This paper investigates the effect of lake acidification on lead mobility by attempting to define the pH at which lead may be released from the sediment of two Adirondack lakes. This study is one of a series of investigations into the consequences of acid precipitation on three lakes typical of the Adirondack State Park, New York.

24290 (PB—83-146142) **Types of potential effects of offshore oil and gas development on marine mammals and endangered species of the northern Bering Sea and Arctic Ocean. Technical paper no. 9 (final).** Cowles, C.J.; Hansen, D.J.; Hubbard, J.D. (Bureau of Land Management, Anchorage, AK (USA). Alaska Outer Continental Shelf Office). Dec 1981. 32p. NTIS, PC A03/MF A01.

The report summarizes information on the types of potential effects on marine mammals, endangered species, and rare plants which may be associated with oil and gas lease sales pending for the northern Bering Sea and arctic regions. The discussion does not imply that any specific level of impact will be sustained but rather identifies the various potential effects associated with offshore exploration, development, and production of petroleum hydrocarbon resources in the Alaska arctic regions.

24291 (PNL-SA—11182) **Long-term simulation of sediment and contaminant transport.** Onishi, Y.; Trent, D.S. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 22p. (CONF-830219—1). NTIS, PC A02/MF A01. Order Number DE83007652.

From EPA/NRC minerals management service workshop; Santa Barbara, CA, USA (7 Feb 1983).

Portions are illegible in microfiche products.

To assess the potential adverse impact of drilling mud and cuttings in the receiving water body, both short- and long-term migration and fate of sediment and contaminants must be evaluated. The long-term behavior of these contaminants are controlled by the transport due to water and sediment movements, intermedia transfer such as adsorption/desorption, chemical and biological degradation and possibly transformation, given the source characteristics of drilling mud and cuttings. We have developed and applied four unsteady sediment-contaminant (both dissolved and particulate contaminant) transport models having the sediment-contaminants interactions such as adsorption/desorption and transport, deposition and resuspension of sediment-sorbed contaminants. Among them are the three-dimensional model, FLESCOT and the two-dimensional model, FETRA. These models calculate time-varying distributions of sediments for each sediment size fraction or type (e.g., sand, silt, clay, or organic matter), dissolved contaminant, and particulate contaminant adsorbed by sediment for each sediment size fraction

or sediment type. They also predict the changes on bed conditions including bed elevation changes due to sediment erosion and/or deposition, bed sediment size distribution changes, and particulate contaminant distributions within the bed.

24292 **Heavy metals in the environs of a smelter.** Swaine, D.J. (CSIRO Division of Fossil Fuels, North Ryde, Australia); Ward, T.J.; Warren, L.J. *Trace Substances in Environmental Health;* **15**: 356-365(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Research is in progress to assess the effects of heavy metals on the aquatic environment near the lead smelter at Port Pirie, South Australia. This paper summarizes some of the work on sediments and biota, namely (1) a method of separation of sediments which avoids chemical changes, (2) some results for Cd, Pb and Zn in separated fractions and (3) results of the analysis of fauna and seagrasses for Cd, Cu, Mn, Pb and Zn.

5203 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 23109, 23119, 23168, 23184, 24263, 24265, 24353, 24484

24293 **(ANL/NESC—992) LADTAP2; liquid pathway dose calculations.** Shields, J.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048992.

Maxima of - 200 nuclides in the release source term 20 sport fish harvest locations 20 commercial fish harvest locations 20 sport invertebrate harvest locations 20 commercial invertebrate harvest locations.

LADTAP2 determines the radiation dose to man from the pathways in the aquatic environment - potable water, aquatic foods, shoreline deposits, swimming, boating, and irrigated foods. Doses for both the maximum individual and the general population are calculated as a function of age group and pathway for appropriate body organs. Calculation of doses to certain species of biota other than man, such as fish, invertebrates, algae, muskrat, raccoon, heron, and duck implementing the models of WASH-1258 is possible, also.IBM360,370,303x;CDC7600,CYBER175; FORTRAN IV; OS/MVT (IBM360), NOS 1.4 (CDC CYBER175); 260K bytes of memory are required by the IBM360 version; the CDC7600 version requires 143,000 (octal) words of memory. Both versions require that the companion dose factor library be equivalenced to FORTRAN logical unit 10..

24294 (LBL—13600, pp 180-182) **Unique developments in laser-induced fluorescence fluorimetry (LIFF).** Klainer, S.M.; Bowman, H.R.; Conway, J.; Hirschfeld, T.; Milanovich, F. Sep 1982. NTIS, PC A09/MF A01. Order Number DE83004044.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In Earth Sciences Division annual report 1981.

A new analytical technique based on laser-induced fluorescence fluorimetry (LIFF) allows the detection and quantitative measurement of a variety of species in groundwater samples through the use of fiber optics for in situ analysis and monitoring and coprecipitation methods for identification and quantification with sensitivities many orders of magnitude higher than presently achieved with other analytical methods. To date, actinides, lanthanides, fluorescent tracers, and some cations, anions, and organics have been analyzed using this method.

24295 **(UCRL—88812) Comparative behavior of plutonium and americium in the equatorial Pacific.** Noshkin, V.E.; Wong, K.M.; Jokela, T.A.; Brunk, J.L.; Eagle, R.J. (Lawrence Livermore National Lab., CA (USA)). 1983. Contract W-7405-ENG-48. 46p. (CONF-830424—1). NTIS, PC A03/MF A01. Order Number DE83009247.

From 4. international ocean disposal symposium; Devon, UK (11 Apr 1983).

Inventories of $^{239+240}$Pu and ^{241}Am greatly in excess of global fallout levels persist in the benthic environments of Bikini and Enewetak Atolls. The amount of $^{239+240}$Pu mobilized to solution at the atolls can be predicted from a distribution coefficient K/sub d/ of 2.3 x 10^5 and the mean sediment concentrations. The mobilized $^{239+240}$Pu has solute-like characteristics and different valence states coexist in solution - the largest fraction of the soluble plutonium is in an oxidized form (+V,VI). The adsorption of plutonium to sediments is not completely reversible because of changes that occur in the relative amounts of the mixed oxidation states in solution with time. Characteristics of $^{239+240}$Pu described at one location may not necessarily describe its behavior elsewhere. The relative amounts of ^{241}Am to $^{239+240}$Pu may be altered in future years because of mobilization and radiological decay.

24296 **Distribution and possible causes of radionuclides in groundwaters of Missouri.** Marikos, M. (Missouri Geological Survey, Rolla). *Trace Substances in Environmental Health;* **15**: 69-77(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

In this study, results of radiochemical analysis of Missouri water supplies have been related to various geologic-hydrologic conditions in an attempt to show probable causes of anomalously high gross-alpha, radium-226 and radium-228 concentrations in some water supplies. The following causes are hypothesized: (1) fixation of U along a salt-water/fresh-water interface zone and (2) deep groundwater circulation and/or venting along faults. The anomalously high radionuclide values have been plotted on factor maps of (1) total dissolved solids in groundwater and (2) surface and subsurface faults. Strong correlations were found to exist with salt-water/fresh-water transition zones and also with zones of faulting. The conclusion is that no single cause is responsible for all the anomalies known to exist in Missouri, but that both of the above factors may contribute locally to high radionuclide levels in Missouri groundwater. Although some areas seem more suspect than others because of the presence of one or more of these conditions, no area can be excluded because of their absence.

24297 **Distribution of ^{226}Ra in the lower paleozoic aquifers of southeast Kansas and adjacent areas.** Macfarlane, P.A. (Kansas Geological Survey, Lawrence). *Trace Substances in Environmental Health;* **15**: 78-85(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Prior routine monitoring of public water supplies by health agencies in the Tri-State Region of Kansas, Oklahoma and Missouri revealed several areas where water samples from wells finished in the Cambro-Ordovician exceeded the maximum contaminant levels set by USEPA for radium ^{226}Ra. The purpose of this study was to determine the region-wide distribution pattern and geochemistry of this radionuclide. ^{226}Ra activities were found to vary from 0.5 to 11 pCi/l (1 pCi = 10^{-12} g) and were highest along the eastern margin of the transition from fresh to saline water; ^{226}Ra activities are highly correlated with specific conductance and the presence of hydrogen sulfide (H_2S). Along 2 traverses through the region uranium (U) concentration decreases by an order of magnitude while the ^{226}Ra/^{234}U activity ratio (AR) increases by an order of magnitude or more where H_2S is present. The ^{234}U/^{238}U AR is uniformly high along both traverses. ^{226}Ra is likely generated by the decay of ^{238}U precipitated from westward flowing groundwaters from the recharge area and is mixed with radium-bearing, low-sulfate connate waters west of the transition zone.

24298 **Radioactivity in groundwater associated with uranium and phosphate mining and processing.** Kaufmann, R.F. (Converse Ward Davis Dixon, Inc., Las Vegas, NV). *Trace Substances in Environmental Health;* **15**: 87-95(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

From 1975 to 1980 USEPA investigations of the uranium and phosphate mining and milling industries addressed associated changes in the radionuclide content of nearby water resources. Available data for ^{226}Ra in central Florida aquifers show no significant difference in phosphate mineralized vs. nonmineralized areas. Apparently neither mineralization nor the industry cause significant

increase in the Ra content of groundwater. Uranium mining and milling in a number of Western States (e.g. New Mexico, Wyoming, Colorado, Washington) cause locally increased levels of U, Ra and Th in shallow groundwater, but potable water supplies have not been adversely affected. Contamination of deep aquifers does not appear to occur, although elevated levels of Ra and U are present in many mine water discharges as a result of ore body oxidation and leaching. Model underground and surface U mines were used to evaluate chemical loading of ^{238}U, ^{226}Ra, ^{210}Pb and ^{210}Po to local and regional hydrographic units. Infiltration of mine water to potable groundwater and suspension/solution of contaminants in flood water constitute the principal elements of the aqueous pathway.

24299 Variations in drinking water quality and the possible effects on human health. Feder, G.L. (Geological Survey, Denver, CO); Hopps, H.C. *Trace Substances in Environmental Health;* **15**: 96-103(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Many natural, potable waters can act as important supplements to food, contributing in a substantial way to the daily dietary requirements of several essential macro and micro elements. This is subject to marked geographic variation, however, because the chemical characteristics of natural waters vary greatly among various geologic terranes. This variation is not limited to the horizontal plane, but has a vertical component as well. For example, waters from wells adjacent to each other but completed at different depths often show marked variations. The range in concentration of chemical constituents in waters from different geologic terranes often varies from one to 3 orders of magnitude. Because of this, statements about the nutritional qualities of water must take into account the source of the water being considered. For example, many water supplies contain over 100 mg/l magnesium, and can provide a major part of the recommended daily requirement (350 mg/day). A recent collaborative study between scientists of the US and the USSR has shown that, at least in some circumstances, distilled (desalinated) water is not a suitable sole source of drinking water for animals, including human beings. We are proceeding with studies to determine the desirable amounts of various inorganic chemicals that would enhance desalinated water in terms of health benefits. In this context, health benefits include the provision of important nutrient elements as well as the exclusion of toxic ones. Results of this research could also provide information of potentially great value in enhancing the chemical composition of natural water supplies that are of suboptimal chemical quality.

24300 Analysis of tapwater lead concentration in homes of children with undue body lead burden. Lubin, A.H.; Signs, S.A.; Caffo, A.L. (Ohio State Univ., Columbus). *Trace Substances in Environmental Health;* **15**: 171-177(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Lead concentrations in household tapwater were analyzed in 49 homes inhabited by children with known elevations of blood lead (≧ 30 μg +- 3/dl) in Columbus, Ohio to assess the contribution to body lead burden of household tapwater intake. Average Pb concentration for all water samples tested was 4 μg/l, well below the EPA maximum allowable 50 μg/l standard. Level of Pb in blood and Pb water concentration for households showed no correlation nor were there significant differences in water Pb concentrations for water supplies in homes with lead compared to copper service pipes. The consistently low levels of Pb in Columbus water (< 10 μg/dl) probably is the result of the alkaline pH (10.0) reducing the solubility of Pb in water. In contrast, water in Boston, Massachusetts has a more acid pH (6.5) resulting in a more frequent incidence of water Pb concentrations greater than 50 μg/l. Based on an estimated steady state normal intake in a preschool child of ~ 130 μg of Pb per day from all sources, Pb intake from consumption of tapwater is unlikely to add significantly to a child's totl body burden of Pb in cities whose water supplies comply with EPA drinking water standards.

5204 Thermal Effluents Monitoring And Transport

REFER ALSO TO CITATION(S) 24252

5205 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 23091, 24267, 24454

53 ENVIRONMENTAL-SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

5301 Social And Economic Studies

REFER ALSO TO CITATION(S) 23093, 23120, 23697, 23698

24301 (ANL/NESC—774) POLUTE; forest air pollutant uptake model. Murphy, C.E. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048774.

Reference reports, DP-MS-76-17, DP-MS-76-28, and DP-MS-76-72.

POLUTE is a computer model designed to estimate the uptake of air pollutants by forests. The model utilizes submodels to describe atmospheric diffusion immediately above and within the canopy, and into the sink areas within or on the trees. The program implementing the model is general and can be used, with only minor changes, for any gaseous pollutant. The model provides an estimate describing the response of the vegetarian-atmosphere system to the environment as related to three types of processes: atmospheric diffusion, diffusion near and inside the absorbing plant, and the physical and chemical processes at the sink on or within the plant.IBM360,370; CSMP; OS/370.

24302 (DOE/EP/12079—T3) Simplified approaches to protecting PSD Class I areas. Final report. Gallagher, J.; Goldman, A.; Fitzgerald, T. (GCA Corp., Bedford, MA (USA). GCA Technology Div.). Feb 1983. Contract AC01-82EP12079. 20p. (GCA-TR—82-89-G). NTIS, PC A02/MF A01. Order Number DE83007410.

Portions are illegible in microfiche products.

In an attempt to lessen the adverse economic impacts of implementation of National Ambient Air Quality Standards, including the concept of Prevention of Significant Deterioration (PSD), a study was undertaken to determine the exact costs of the current program and whether alternative, area-based, control strategies can mitigate adverse impacts. Results of this initial study, which have been reported previously, point to the potential ability of some type of area-based alternative (in particular, a combination of an emission free zone and distance-based emission density zoning) to provide protection comparable to existing PSD increments at significantly lower administrative costs. This follow-up study, designed to further investigate this potential, is divided into three tasks. In the first, area-based impacts are recalculated for the three original facilities based on median (rather than maximum) concentrations at a given distance from the Class I area. These results are presented. The second task added an industrial facility, a pulp and paper plant, to the previous analysis, estimating ambient concentrations (CRSTER), and calculating area-based impacts for both maximum and median concentrations. Finally, Task 3 attempts to develop a generalized model, relating concentration to distance, stack height, and other factors, for all source types, which could be used to estimate the impacts of area-based regulations. Results are reported.

24303 **(ONWI—266) Methods for assessing the socioeconomic impacts of large-scale resource developments: implications for nuclear repository siting.** Murdock, S.H.; Leistritz, F.L. (Texas A and M Univ., College Station (USA). Dept. of Rural Sociology; North Dakota State Univ., Fargo (USA). Dept. of Agricultural Economics). Mar 1983. Contract AC06-76RL01830. 409p. NTIS, PC A18/MF A01. Order Number DE83008610.

Portions are illegible in microfiche products.

An overview of the major methods presently available for assessing the socioeconomic impacts of large-scale resource developments and includes discussion of the implications and applications of such methods for nuclear-waste-repository siting are provided. The report: (1) summarizes conceptual approaches underlying, and methodological alternatives for, the conduct of impact assessments in each substantive area, and then enumerates advantages and disadvantages of each alternative; (2) describes factors related to the impact-assessment process, impact events, and the characteristics of rural areas that affect the magnitude and distribution of impacts and the assessment of impacts in each area; (3) provides a detailed review of those methodologies actually used in impact assessment for each area, describes advantages and problems encountered in the use of each method, and identifies the frequency of use and the general level of acceptance of each technique; and (4) summarizes the implications of each area of projection for the repository-siting process, the applicability of the methods for each area to the special and standard features of repositories, and makes general recommendations concerning specific methods and procedures that should be incorporated in assessments for siting areas.

24304 **(PB—83-146993) State-local relations and urban technology: a study in intergovernmental decision making - executive summary.** Lambright, W.H.; Spencer, C.M.; McMaster, D.J.; Falk, J.D.; Lakins, A.B. (Syracuse Research Corp., NY (USA)). Sep 1982. 26p. (SRC-TR—81-524-SUM). NTIS, PC A03/MF A01.

Case histories of 23 innovations in New York and Texas are summarized. Innovations involved a range of state service systems: health, energy, environmental management, law enforcement, and fire protection. The types of innovations varied, ranging from hardware to managerial and institutional innovations. The stages of the innovation process--agenda setting, adoption, implementation, incorporation--are discussed. Of the 23 innovations studied, 14 had been incorporated and 6 were on their way to being incorporated. Of the three, two were rejected outright and one was stuck in the agenda setting stage. Reasons for rejection are considered, as are factors that affect the relative ability of state governments to succeed or fail in their policy roles.

24305 **(PB—83-147009) State-local relations and urban technology: a study in intergovernmental decision making.** Lambright, W.H.; Spencer, C.M.; McMaster, D.J.; Lakins, A.B. (Syracuse Research Corp., NY (USA)). Sep 1982. 247p. (SRC-TR—81-524). NTIS, PC A11/MF A01.

Case studies of 23 innovations in New York and Texas are reported. Innovations involved a range of state service systems: health, energy, environmental management, law enforcement, and fire protection. The types of innovations varied, ranging from hardware to managerial and institutional innovations. The stages of the innovation process--agenda setting, adoption, implementation, incorporation--are discussed. Of the 23 innovations studied, 14 had been incorporated and 6 were on their way to being incorporated. Of the other three, two were rejected outright and one was stuck in the agenda setting stage. Reasons for rejection are considered, as are factors that affect the relative ability of state governments to succeed or fail in their policy roles.

24306 **Oxidant air pollution: estimating economic effects on US vegetation. Paper 81.2.2.** Moskowitz, P.D.; Coveney, E.A.; Medeiros, W.H.; Morris, S.C. (Brookhaven Natl Lab, Upton, NY, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

The impact of air quality on plants was assessed using the SRI model (derived at the Stanford Research Institute) and observation of vegetation as a factor of data monitored. The attention was focused on alfalfa which is widely grown. The validity of the SRI model was examined and found to be rather accurate while the new DAMAGE model was more representative as it shows the effects of oxidants in the air. 16 refs.

5302 Assessment Of Energy Technologies

24307 **(AD-A—122599/4) An incentive approach to eliciting probabilities. Research report.** Shachter, R.D. (California Univ., Berkeley (USA). Operations Research Center). Jul 1982. 15p. (ORC—82-9). NTIS, PC A02/MF A01.

A decision-maker (e.g., the Nuclear Regulatory Commission) seeks an expert's probabilities for uncertain quantities of interest (e.g., a seismologist's forecast of earthquakes), and wants the expert's reward to depend on the accuracy of the predictions. Assume that the expert compares compensation schemes on the basis of the expected utility of the dollar payoffs, and is willing to reveal his utility function for money. A reward is called proper if the expert is never encouraged to state probabilities he does not truly believe. It is strictly proper if he is, in fact, encouraged to state his beliefs. The reward procedure suggested in this paper uses the expert's stated probabilities and utility function to select from a set of possible payoffs. This procedure is always proper, but may not be strictly proper . If the preferred payoff is independent of the outcome whenever the decision-maker and expert agree on the probabilities, then they are said to be jointly risk-averse. (For example, if the decision-maker agrees to play bookie to a risk-averse expert, then they are jointly risk-averse.) In this case, the reward is shown to be strictly proper, as long as they don't disagree too much, so the expert can gain from researching the problem and carefully assessing his probabilities. In addition, the expert would prefer to make the bet more detailed, distinguishing between finer grain events, whenever such detail exposes new differences of opinion.

5303 Environmental Impact Statements

REFER ALSO TO CITATION(S) 23186

24308 **(DOE/EIS—0089-Add.) Addendum to Environmental Impact Statement. Operation of PUREX and Uranium Oxide Plant Facilities.** (USDOE, Washington, DC). Feb 1983. 55p. NTIS, PC A04/MF A01. Order Number DE83007616.

Portions are illegible in microfiche products.

A draft EIS for operation of PUREX and Uranium Oxide Plant Facilities at the Hanford Site, (Richland) Washington was prepared and made available for public review and comment in May 1982. Twelve comment letters were received. Consideration of these comment letters in preparing the final EIS required only minor changes to the draft EIS. The changes to the draft EIS, the comment letters, and responses to the letters are contained in this addendum. This addendum and the draft EIS constitute the final EIS. The proposed action is the resumption of operations of the PUREX/UO_3 facilities to produce plutonium (and other special nuclear materials) for national defense needs. The facilities will include modifications to mitigate environmental impacts, reduce occupational hazards, and improve safety and security measures around the facilities. The scope of the EIS includes discussion of environmental impacts associated with the resumption of operation of the PUREX/UO_3 facilities. Three alternatives and their environmental impacts are evaluated and compared with the proposed action.

24309 **(DOE/EIS—0097) Transmisson-Facilities Vegetation-Management Program: Bonneville Power Administration. Draft environmental impact statement.** (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC). Sep 1982. 303p. (DOE/BP—124). NTIS, PC A14/MF A01. Order Number DE83002971.

Portions are illegible in microfiche products.

The proposed program would manage vegetation on some 84,000 acres of rights-of-way and at 357 substations and other facilities throughout Bonneville Power Administration's (BPA's) six-state service area. On rights-of-way, tall-growing vegetation would be prevented from growing into transmission lines and from blocking access roads. At substations and microwave yards, all vegetation would be removed to prevent fire and safety hazards. Where appropriate, noxious weeds would be controlled in cooperation with local landowners. The Proposed Program would use manual, spot chemical, broadcast chemical, and biological methods to manage vegetation. Selection of treatments to use in specific management situations would be based on consideration of social, ecological and economic consequences of using the various methods. Treatments would be implemented according to the constraints and mitigation measures provided by BPA's Transmission Line Maintenance Standard. This EIS examines potential impacts on public health, worker safety, water quality and fisheries, land uses, plants and animals, soils, and visual, cultural, and historical resources. In particular, the potential impacts of using herbicides in spot chemical and broadcast chemical treatments are examined. Identified potential adverse impacts would be avoidable through implementation of the BPA Transmission Line Maintenance Standard and other mitigation measures. Introductions of herbicides into environments of the Pacific Northwest would occur; however, these would not be toxicologically significant due to the low inherent toxicity of the herbicides proposed for use, due to their rapid degradation in soil and water, and due to their failure to accumulate in biological organisms. Mitigation measures such as stream buffer zones and drift control measures for broadcast applications and monitoring of herbicide residues in soil and water would minimize possibilities of adverse impacts.

55 BIOMEDICAL SCIENCES, BASIC STUDIES

5502 Biochemistry

REFER ALSO TO CITATION(S) 24345, 24392, 24412, 24433, 24462, 24465, 24468, 24471, 24472, 24473

24310 (ORNL—5927, pp 2-4) **Structural aspects of DNA in its replication and repair.** Mitra, S.; Pal, B.C.; Bhattacharyya, A.; Bates, R.C.; Foote, R.S.; Snow, E.T.; Wobbe, C.R.; Morse, C.C.; Snyder, C.E. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Many toxic by-products of energy production and utilization are mutagenic and carcinogenic and interact with DNA. The repair of lesions produced in DNA plays a critical role in its replication as well as in the ultimate expression of mutagenesis and carcinogenesis. In view of this, the research in this laboratory involves DNA structure, replication and repair and has two broad aims, namely (a) elucidation of the mechanism of genome replication and its control in mammals and (b) role of DNA repair in mutagenesis and carcinogenesis induced by simple alkylating carcinogens. In pursuit of the first goal, structure and replication of teratogenic mammalian parvovirus genomes are being studied because these linear single-stranded DNAs appear to be dependent on the host-specific synthetic and regulatory factors. For achieving the second aim, repair and mutagenic potential of base lesions produced by simple nitrosamines are being investigated.

24311 (ORNL—5927, pp 4-6) **Mechanisms of mutagenesis and DNA repair.** Masker, W.E.; Dodson, L.A.; Kuemmerle, N.B.; Maupin, M.K. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

This research effort is devoted to a study of DNA repair and the molecular mechanism of mutagenesis. A major aspect of our work involves the use of in vitro DNA metabolic systems able to replicate, repair, and recombine DNA from bacteriophage T7 under relatively well defined biochemical conditions. A second in vitro system can encapsulate the product DNA recovered from the DNA synthesis system and produce fully infective T7 phage in vitro. Thus, DNA packaging provides a way of using biological activity as an endpoint in characterizing the physical integrity and genetic make-up of DNA that has been damaged by chemicals or radiation and then subjected to prior in vitro manipulations before being encapsulated into phage heads. Application of the system described above to studies of in vitro mutagenesis was possible because of improvements to the DNA packaging system. By isolating capsids that are precursors to T7 phage and identifying components such as ATP and osmotic stabilizing factors that are important to DNA packaging, we have achieved efficiencies as high as 8% phage production per genome equivalent of DNA. Part of our program has focused on excision repair mechanisms in bacteria. In collaboration with R. Ley we used two distinct techniques to measure the extent to which repair patches incorporated as DNA damage are removed from the genome during excision repair.

24312 (ORNL—5927, pp 6-7) **mRNA processing in yeast.** Stevens, A. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Investigations in this laboratory center on basic enzymatic reactions of RNA. Still undefined are reactions involved in the conversion of precursors of mRA (pre-mRNA) to mRNA in eukaryotes. The pre-mRNA is called heterogeneous nuclear RNA and is 2 to 6 times larger than mRNA. The conversion, called splicing, involves a removal of internal sequences called introns by endoribonuclease action followed by a rejoining of the 3'- and 5'-end fragments, called exons, by ligating activity. It has not been possible yet to study the enzymes involved in vitro. Also undefined are reactions involved in the turnover or discarding of certain of the pre-mRNA molecules. Yeast is a simple eukaryote and may be expected to have the same, but perhaps simpler, processing reactions as the higher eukaryotes. Two enzymes involved in the processing of pre-mRNA and mRNA in yeast are under investigation. Both enzymes have been partially purified from ribonucleoprotein particles of yeast. The first is a unique decapping enzyme which cleaves [^{3}H]m^{7}Gppp [^{14}C]RNA-poly (A) of yeast, yielding [^{3}H]m^{7}GDP and is suggested by the finding that the diphosphate product, m^{7}GpppA(G), and UDP-glucose are not hydrolyzed. The second enzyme is an endoribonuclease which converts both the [^{3}H] and [^{14}C] labels of [^{3}H]m^{7}Gppp[^{14}C]RNA-poly(A) from an oligo(dT)-cellulose bound form to an unbound, acid-insoluble form. Results show that the stimulation involves an interaction of the labeled RNA with the small nuclear RNA. The inhibition of the enzyme by ethidium bromide and its stimulation by small nuclear RNA suggest that it may be a processing ribonuclease, requiring specific double-stranded features in its substrate. The characterization of the unique decapping enzyme and endoribonuclease may help to understand reactions involved in the processing of pre-mRNA and mRNA in eukaryotes.

24313 (ORNL—5927, pp 7-9) **Control of transcription in animal viral systems.** Niyogi, S.K.; Allison, D.P.; Feldman, R.P.; Hellwig, R.J.; Sinha, S.N.; Yette, M.L. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Our investigations are specifically directed towards elucidating the molecular mechanisms of transcription in two animal viral systems. We have extensively studied the DNA tumor virus, simian virus (SV) 40, and more recently, adenovirus 2. We are also conducting studies of the structure of the transcriptionally active viral nucleoprotein in order to fully understand the role of various proteins in virus transcription. Specific, accurate initiation of transcription of class II (hnRNA and mRNA) genes has recently been achieved with three types of crude cell-free extracts, using as templates promoter-containing restriction fragments of various DNAs, and analyzing run-off transcripts. However, cell-free extracts, although capable of specific initiation and capping, are deficient in splicing, proper termination and polyadenylation of the nascent RNA product. Ordered nucleoprotein structures with certain common characteristics can be formed by interaction of DNA with non-histone are generated in currently used cell-free transcription systems. We also find that only those purified nucleoprotein com-

plexes containing the promoter can be actively transcribed in the presence of additional cell-free extract, suggesting that such structures and their protein components may be important in transcription. Our results indicate that the SV40 DNA-protein complexes formed with the in vitro systems mimic, in physical properties, the SV40 minichromosomes but differ from the latter in their protein composition. Using the bacterial plasmid pBR322 as the cloning, vehicle, we have recently cloned (with the help of Dr. Larry Boone of this Division) adenoviral DNA fragments containing the major late viral promoter. Upon incubation with the cell-free transcription extracts, these DNAs are also converted to ordered nucleoprotein complexes and direct specific initiation of transcription.

24314 (ORNL—5927, pp 9-12) **Correlation of structure and functions of proteins involved in phage T5 DNA replication: an approach to study of mutagenesis.** Fujimura, R.K.; Roop, B.C. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Phage T5 DNA is a linear duplex with MW of about 7.7 x 10^7. In vivo analysis suggests that it is capable of initiating DNA replication from several sites with a primary site around the midregion of T5 DNA. It is our objective to isolate and characterize all the proteins required for every process involved in T5 DNA replication, particularly initiation, translocation, unwinding, and fidelity. So far, two gene products coded by phage T5 DNA are known to be absolutely essential for DNA replication. These are the DNA polymerase coded by gene D7 to D9 and the DNA binding protein coded by gene D5 (gpD5). T5 DNA polymerase is a monomeric, multifunctional enzyme. Its most preferred primer-template is single-stranded DNA with a primer. However, it does bind to a nick of duplex DNA and utilizes the 3'-OH end of a nick as a primer and elongates it from such an end, displacing the strand ahead of it. Thus, the same polymerase is capable of acting as an editing enzyme correcting mistakes as it copies a template. Gene product D5 has a dual role in DNA replication and control of transcription. It is essential for the shutoff of some early transcription and for the expression of late genes. Interaction of duplex DNA with gpD5 was studied by velocity sedimentation of the complex to apparent equilibrium in a metrizamide gradient. These findings suggest that enzymes that require properly H-bonded 3' OH ends of DNA are inhibited by gpD5 complexed to duplex region, but enzyme that preferentially acts on single-stranded DNA and distorted duplex DNA are not inhibited. By transfection of E. coli with restriction enzyme digests that were fractionated according to size and by use of such transfected cells as hosts for marker rescue experiments with amber mutants of the T5 DNA polymerase gene, we were able to identify the DNA fragment with the T5 DNA polymerase gene. Such DNA is putative T5 DNA polymerase gene and they are being characterized.

24315 (ORNL—5927, pp 12-13) **Nucleic acid biochemistry of cells.** Volkin, E.; Boling, M.E.; Jones, M.H. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The present work of our group is concerned mostly with the relationship of the nucleotide precursor pool in eukaryotic systems to the synthesis and degradation of the nucleic acids. In particular, we are investigating the effect of a variety of metabolic agents, especially chemical mutagens and carcinogens, on the metabolic pathways involved in the biosynthesis of these precursors. Cellular functional compartmentation of the nucleotide pool plays an important role in these systems, and we are pursuing this aspect as well.

24316 (ORNL—5927, pp 14-16) **Chromosome chemistry.** Olins, D.E.; Olins, A.L.; Bunick, G.J. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The major goal of this laboratory is to analyze and understand the macromolecular structure of eukaryotic chromosomes. This macromolecular structure is intimately involved in the three major functions of chromosomes: DNA packaging; transcription; and replication. Any of these functions can be damaged by exposure to abnormal physical or chemical agents. Our laboratory employs a wide range of biophysical, biochemical and ultrastructural techniques to work towards detailed macromolecular models. During the past two years we have concentrated our efforts in four major directions: (1) x-ray crystallography of avian erythrocyte mononucleosomes; (2) biophysical studies of nucleosome-nonhistone (i.e., HMG 14 and 17) complexes; (3) histone and chromatin structure in hypotrichous ciliated protozoa; and (4) 3-D ultrastructure of chromosomes in important physiologic states as determined by stereo-EM and by EM tomography. Our major accomplishments in each of these areas are summarized.

24317 (ORNL—5927, pp 16-18) **Structure and organization of the eukaryotic genome with special emphasis on satellite DNAs.** Skinner, D.M.; Bonnewell, V.; Fowler, R.F.; Mykles, D.L.; Soumoff, C.; Spann, M.S. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Our goal has been and continues to be the analysis in chemical, physical and molecular biological terms of satellite DNAs. We use Crustacea as model systems because of their cyclic growth phases and the wide spectrum of complexity of their satellites. In order to carry out this research, we work in two areas which are closely related and mutually supportive. The two areas are (1) the structure and function of satellite DNAs, and (2) the control and phenomenology of the crustacean molt cycle. Work in both areas has reached a point where their convergence and interrelatedness will be mutually most advantageous. For our studies on the function of satellite DNAs - some of which may be transcribed - we require RNA from animals at different growth stages. From our research on the crustacean molt cycle we can trigger precocious molts and synchronize the molt cycle of populations of animals. Our method permits their survival at ecdysis in contrast to earlier methods in which precocious ecdyses were initiated by the removal of a molt inhibitory hormone localized in the eyestalks. Thus, we can obtain macromolecules from animals after as well as before ecdysis.

24318 (ORNL—5927, pp 34-35) **X-ray diffraction.** Einstein, J.R.; Wei, C.H. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

We have been interested in structural elucidation by x-ray diffraction of compounds of biological interest. Understanding exactly how atoms are arranged in three-dimensional arrays as molecules can help explain the relationship between structure and functions. The species investigated may vary in size and shape; our recent studies included such diverse substances as antischistosomal drugs, a complex of cadmium with nucleic acid base, nitrate salts of adenine, and proteins.

24319 (ORNL—5927, pp 35-37) **Protein luminescence: the end of the beginning.** Longworth, J.W. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

My last 23 years have been devoted to the study of luminescence of proteins and include long periods of investigation of luminescence of nucleic acids. The conclusion from these years of work upon protein luminescence is the great diversity of behavior that is found in proteins, and this arises as a result of sidechain interactions created by the folding of the polypeptide chain. It would be of interest if an example of specific photophysical effect could be detected which arose as a consequence of a specific interaction, and as potential hydrogen bonds are rarely left unsatisfied in protein structures, interactions engaging the phenolic hydroxyl exist widely. The entire armory of my contributions to this topic of spectroscopy can be found in this study of tyrosine fluorescence of human serum albumin. This protein as yet has no established molecular structure but amino acid and gene sequences show that it is a result of a triplication of a double duplication block, where the fourth sequence block is extensively deleted and is a relic; that is, there are nine pronounced homologous sequence blocks. One can expect the structure to be composed of three homologous folding domains and

each domain to possess a three-fold repeat. Within this protein lie 18 tyrosins and 1 tryptophan.

24320 (ORNL—5927, pp 37-39) **Protein chemistry and enzyme mechanisms.** Hartman, F.C.; Donnelly, M.I.; Herndon, C.S.; Lee, E.; Stringer, C.D. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Since virtually all biological processes are enzyme mediated, studies of enzyme structure and function are clearly central to a broad-based program concerning health effects of environmental agents. Our efforts are focused on active-site characterization which bears directly on the elucidation of the principles underlying two key properties of enzymes: their stringent specificity and their enormous catalytic efficiency. The most versatile approach for the selective introduction of a chemical label into the active site, thereby providing structure/function correlations and identifications of active-site residues, is affinity labeling. In its traditional form, affinity labeling entails the use of reactive analogs of natural substrates to label substrate binding sites. Conceptually, it can be viewed as combining features of competitive inhibitors and general protein reagents into a single molecule. The substrate-like features of the reagent direct it to the active site in a fashion completely analogous to the binding of competitive inhibitors. This binding step results in a highly localized concentration of reagent within the substrate binding site and thus increases the likelihood of modification of a residue within this site as compared with other positions of the protein molecule. Many of our recent investigations have centered on ribulosebisphosphate carboxylase, the plant enzymeessential for the photosynthetic assimilation of CO_2. We have designed several affinity labels for the carboxylase all of which bear a structural relationship to ribulosebisphosphate. These reagents have permitted the identification of Lys-175 and Lys-334 as residues within the binding domain for substrate. Another major effort involves the design of reactive analogs of α-ketoglutarate as potential active-site probes for the numerous enzymes that process this key metabolite.

24321 (ORNL—5927, pp 175-178) **Tumor cell surface proteins.** Kennel, S.J.; Braslawsky, G.R.; Flynn, K.; Foote, L.J.; Friedman, E.; Hotchkiss, J.A.; Huang, A.H.L.; Lankford, P.K. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Cell surface proteins mediate interaction between cells and their environment. Unique tumor cell surface proteins are being identified and quantified in several tumor systems to address the following questions: (i) how do tumor-specific proteins arise during cell transformation; (ii) can these proteins be used as markers of tumor cell distribution in vivo; (iii) can cytotoxic drugs be targeted specifically to tumor cells using antibody; and (iv) can solid state radioimmunoassay of these proteins provide a means to quantify transformation frequencies. A tumor surface protein of 180,000 M/ sub r/ (TSP-180) has been identified on cells of several lung carcinomas of BALB/c mice. TSP-180 was not detected on normal lung tissue, embryonic tissue, or other epithelial or sarcoma tumors, but it was found on lung carcinomas of other strains of mice. Considerable amino acid sequence homology exists among TSP-180's from several cell sources, indicating that TSP-180 synthesis is directed by normal cellular genes although it is not expressed in normal cells. The regulation of synthesis of TSP-180 and its relationship to normal cell surface proteins are being studied. Monoclonal antibodies (MoAb) to TSP-180 have been developed. The antibodies have been used in immunoaffinity chromatography to isolate TSP-180 from tumor cell sources. This purified tumor antigen was used to immunize rats. Antibody produced by these animals reacted at different sites (epitopes) on the TSP-180 molecule than did the original MoAb. These sera and MoAb from these animals are being used to identify normal cell components related to the TSP-180 molecule.

24322 (PB—82-922919) **Excision repair of DNA damage. III. The regulation of excision repair. Oncology overview.** (National Cancer Inst., Bethesda, MD (USA). International Cancer Research Data Bank). Dec 1982. 61p. NTIS, PC $5.25/MF $3.00.

Oncology Overviews are a service of the International Cancer Research Data Bank (ICRDB) Program of the National Cancer Institute, intended to facilitate and promote the exchange of information between cancer scientists by keeping them aware of literature related to their research being published by other laboratories throughout the world. Each Oncology Overview represents a survey of the literature associated with a selected area of cancer research. It contains abstracts of articles which have been selected and organized by researchers associated with the field. Contents: The effect of the cell cycle on excision repair in eukaryotes; Enhancement of excision repair in prokaryotes by mutagens and carcinogens--The adaptive response; Enhancement of excision repair in eukaryotes by mutagen and carcinogen exposure; Alterations of excision repair during carcinogenesis; Effects of eukaryotic cell differentiation on excision repair; Age-related factors affecting excision repair; Reviews on gene expression and excision repair.

24323 **Some factors influencing liver metallothionein levels in rats and mice.** Jang, T.; Lee, M. (Univ. of British Columbia, Vancouver, Canada). *Trace Substances in Environmental Health;* **15**: 226-232(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Liver metallothionein (MT) was measured by the 203-mercury binding method of Piotrowski in the livers of rats and mice subjected to bilateral adrenalectomy or to sham adrenalectomy. Sham operation was followed by an increase in the level of MT at 24 hours; this immediately began to decrease, reaching control levels by 7 days. Adrenalectomy was also followed by an increase in MT, but the levels remained elevated for several days before beginning to decline. Mice which were adrenalectomized and allowed to recover for 28 days showed an increase in MT when subjected to sham operation. Ether anaesthesia without an incision did not increase the level of MT. Hypophysectomized mice had higher levels of MT than did controls, and these levels were further increased by sham adrenalectomy. Sprague-Dawley rats showed a similar response to adrenalectomy and to sham operation. It is concluded that the sham operation-induced increase in MT is probably not a result of a stress-induced release of adrenal hormones, but that adrenal hormones may play some role in the degradation or turnover of MT. The pituitary may also have some role in MT turnover.

24324 **X-ray fluorescence/X-ray energy analysis as a trace element tool.** Woldseth, R. (Kevex Corp., Foster City, CA). *Trace Substances in Environmental Health;* **15**: 308-314(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The applicability and virtues of an analytical technique to a given class of analytical problems is subject to evaluation via a range of performance factors. The list may include specificity, sensitivity, detection limits, precision, accuracy, speed and convenience, to mention a few. X-ray Fluorescence-X-ray Energy Spectrometry analysis is reviewed for the most important performance parameters, in particular as pertaining to its use as a tool for trace element analysis in environmental, forensic and general bio-medical analysis problems. Data are given in conformance with NCCLS Standards for Protocol of Performance Claims for Clinical Chemical Methods.

5503 Cytology

REFER ALSO TO CITATION(S) 24329, 24397

24325 **(DOE/EV/02423—T1) Studies of membrane structure by freeze-etching. Final report, January 1, 1979-December 31, 1982.** Branton, D. (Harvard Univ., Cambridge, MA (USA). Biological Labs.). Mar 1983. Contract AC02-76EV02423. 7p. NTIS, PC A02/MF A01. Order Number DE83008388.

The structure and organization of biological membranes has been studied using a variety of physical and biochemical techniques together with electron microscopy and freeze-etching. These studies have provided knowledge relating the architecture of cellular

membranes to their role in modulating cell behavior and in regulating the transport of molecules into and out of cells. The human red blood cell has served as a model system in which to analyze the protein-protein and protein-lipid interactions that explain membrane function and cell shape. New approaches and technological advances have been used to identify specific trans-membrane proteins in freeze-fractured replicas with precision sufficient to specify how these proteins are distributed and associated with other proteins on the cytoplasmic face of the membrane.

24326 **Polycarbonate filter technique for collection of sorted cells.** Folstad, L.; Look, M.; Pallavicini, M. (Lawrence Livermore National Lab., CA). *Cytometry (Baltimore);* 3: No. 1, 64-65(1982). Contract W-7405-ENG-48.

We describe the application of polycarbonate filters to the collection of cells sorted by flow cytometry. Cells are sorted directly onto polycarbonate filters and transferred to microscope slides which are then processed to dissolve the filter and remove pore outlines. The technique results in cell preparations which retain cellular morphology and have highcell recovery of 82 to 100%.

24327 **High resolution DNA content measurements of mammalian sperm.** Pinkel, D.; Lake, S.; Gledhill, B.L.; Van Dilla, M.A.; Stephenson, D.; Watchmaker, G. (Lawrence Livermore National Lab., CA). *Cytometry (Baltimore);* 3: No. 1, 1-9(1982).

The high condensation and flat shape of the mammalian sperm nucleus present unique difficulties to flow cytometric measurement of DNA content. Chromatin compactness makes quantitative fluorescent staining for DNA difficult and causes a high index of refraction. The refractive index makes optical measurements sensitive to sperm head orientation. We demonstrate that the optical problems can be overcome using the commercial ICP22 epiillumination flow cytometer (Ortho Instruments, Westwood, MA) or a specially built cell orientating flow cytometer (OFCM). The design and operation of the OFCM are described. Measurements of the angular dependence of fluorescence from acriflavine stained rabbit sperm show that it is capable of orienting flat sperm with a tolerance of +-7°. Differences in the angular dependence for the similarly shaped bull and rabbit sperm allow discrimination of these cells. We show that DNA staining with 4-6 diamidino-2-phenylindole (DAPI) or an ethidium bromide mithramycin combination allows resolution of the X and Y populations in mouse sperm. They have also been successful with sperm from the bull, ram, rabbit, and boar. Reliable results with human sperm are not obtained. The accuracy of the staining and measurement techniques are verified by the correct determination of the relative content of these two populations in sperm from normal mice and those with the Cattanach [7 to X] translocation. Among the potential uses of these techniques are measurement of DNA content errors induced in sperm due to mutagen exposure, and assessment of the fractions of X and Y sperm in semen that may have one population artifically enriched.

5504 Genetics

REFER ALSO TO CITATION(S) 24317, 24366, 24377, 24378, 24379, 24387, 24412, 24418, 24428, 24441, 24449

24328 **(DOE/EV/01300—T1) Organization of the R chromosome region in maize.** (Wisconsin Univ., Madison (USA)). Jan 1983. Contract AC02-76EV01300. 6p. NTIS, PC A02/MF A01. Order Number DE83008329.

Portions are illegible in microfiche products.

Alleles of R govern the presence, intensity and time of anthocyanin pigmentation, plant part by plant part. A given allele often comprises more than one unit of independent function. One objective has been to characterize alleles in terms of genic element composition. What is the number, arrangement and tissue-specific domain of the elements comprising particular alleles were the questions posed. Various patterns of organization have been uncovered among alleles carried in cultivated races of maize. Some especially complex alleles have yet to be resolved fully in these terms. New patterns of organization undoubtedly remain to be discovered. We nevertheless relegated this line of inquiry to a position of secondary emphasis over the course of the past three years. Primary attention was shifted to analysis of individual genic elements. Two approaches utilize given elements which have been fractionated from allelic complexes or which occur singly in cultivated races. Recombinational tests of single element heterozygotes focuses on the components which confer tissue specific differences. An alternative approach makes use of phenotypically null mutations of single element alleles. Such are combined in heterozygotes with elements of contrasting tissue effect to recombine a functional form of the mutant allele. The resynthesis of elements in this manner appears to provide a systematic means of identifying components that are essential for an element's function but which are not responsible for its tissue specific action. The nature of genetic instabilities continues as another major area of interest. The kernel-spotting allele R-stippled is associated with two sorts of instabilities. Its somatic and germinal reversion to uniform strong color is attributable to a transposable unit. Its capacity to reduce the functional level of sensitive alleles in heterozygotes (paramutation) has a different basis. Organization of its paramutagenic potential is reported.

24329 (ORNL—5927, pp 76-78) **Drosophila cytology and genetics.** Grell, R.F.; Generoso, E.E. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The meiotic process constitutes the core of eukaryotic genetics. An understanding of the normal course of events during this period is basic to evaluating the ability of physical agents such as heat, and chemical agents including mutagens, to alter the process and lead to generally detrimental consequences. Despite the critical roles that they play, the mechanisms of the two principal early meiotic events, namely, synapsis and recombination, remain virtually unknown. We have been involved in studies of both events in the Drosophila pro-oocyte, the former through EM and EM autoradiographic approaches and the latter through EM and EM autoradiographic approaches and the latter through genetic approaches, although a wide area of overlap has emerged. The aspect we chose to explore concerns the time of synapsis and recombination on the premise that a resolution of this parameter should contribute to a clarification of the mechanisms by eliminating from among the multitude of proposed models those inconsistent with our findings. The landmark to which both events are being related is premeiotic-S. Recognition of synapsis depends on visualization of the synaptonemal complex (SC), a structure revealed by EM, which lies between paired homologues. During the current year we have completed a detailed study at the ultrastructural level of the development of the pro-oocyte nucleus. To provide an unambiguous temporal order, the first pro-oocyte in the developing pupal germarium has been followed at 6 h intervals from its formation (129 h post-oviposition) until State 1 (168 hr) when its germarial phase is complete. This time interval encompasses the periods of synapsis and recombination.

24330 (ORNL—5927, pp 101-102) **Development of methods and criteria for deciding whether specific-locus mutation-rate data indicate a positive, negative, or inconclusive result.** Selby, P.B.; Olson, W.H. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The binomial approximation of the UMPU (uniformly most powerful unbiased) test for the equality of 2 binomial proportions was shown to be an easily applied and extremely accurate method for testing the hypothesis that a given mouse specific-locus mutation frequency is no higher than the spontaneous mutation frequency. Critical sample sizes were calculated, using the Fisher exact test, to show at a glance whether $P < 0.05$ for comparisons with the spontaneous male mutation frequency of 43 mutations in 801,406 offspring. Agreement with the critical sample sizes calculated using the binomial approximation of the UMPU test was perfect in three of the five comparisons made [f/sub (1) through f/sub (5)/], and the critical sample size was only off by one for the others.

24331 (ORNL—5927, pp 104-106) **Further development of techniques for studying induction of dominant skeletal mutations.** Selby, P.B.; Raymer, G.D.; McKinley, T.W. Jr. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The breeding-test method for studying induction of dominant skeletal mutations was employed by us in an earlier experiment, the results of which have been applied by international and national committees in estimating genetic risk from radiation. The breeding-test method permits proof of transmissibility and the setting up of valuable mutant stocks, but it is slow and tedious and requires a high level of training for observers. As a result, emphasis has been put on developing a much more rapid method that could be used in a wider variety of applications. Three non-breeding-test methods have been developed to date, these being the sensitive-indicator method, the multiple-anomaly inferential method, and the mutational-index method. All three of these methods can be applied in studying a single sample of mouse skeletons. The total time required for all three methods is less than one-tenth of that needed for the breeding-test method, and observers require much less training. The three methods are described.

24332 (ORNL—5927, pp 125-126) **Qualitative analysis of mouse specific-locus mutations.** Russell, L.B.; Russell, W.L.; Bernstine, E.G.; Montgomery, C.S.; Steele, M.S.; Thompson, H.M. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Specific-locus tests, which have for years been in use in our laboratory to measure the rate of induction of point mutations, yield a wealth of genetic material that can be carried on in stocks for subsequent study. Analysis of specific-locus (SL) mutations at three loci has identified over 33 distinct complementation groups - most of which are probably overlapping deficiencies - and 13 to 14 new functional units. Analysis of SL mutations has provided information on genetic expression in mammals. The spectrum of mutations induced (e.g., the ratio of nulls to altered-activity mutants) depends on the nature of the mutagen and the type of germ cell exposed. Radiation of spermatogonia produces intragenic as well as null mutations. Spontaneous mutations (several of which may arise in the zygote or in early cleavage) have an admixture of types not present in populations of mutations induced in germ cells, and this raises doubts concerning the accuracy of doubling-dose calculations in genetic risk estimation. The analysis of SL mutations has yielded genetic tools for the construction of detailed gene-dosage series (from 0 to 3, in steps of 0.5), cis-trans comparisons, the mapping of known genes and identification of new genes, genetic rescue of various types, and the identification and isolation of DNA sequences. Results from the analyses of mutations will contribute answers to some of the pragmatic questions in germ-line mutagenesis and risk assessment in the following areas: the relative roles of intracellular conditions (e.g., nature of chromatin, presence of repair enzymes) and secondary circumstances (e.g., selection) in determining the quantity and quality of transmitted mutations; the validity of quantitative extrapolations, such as projections to low doses and calculations of doubling dose; and the relation between measures of mutation rate and projections of phenotypic damage.

24333 (ORNL—5927, pp 126-127) **Analysis of the albino-locus region of the mouse: characterization of 34 deficiencies.** Russell, L.B.; Raymer, G.D.; Montgomery, C.S. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

In our continuing detailed analysis of the albino-locus region, we have investigated 34 independent nonviable c-locus mutations, derived from radiation experiments using the specific-locus method. These were tested for involvement of nearby markers tp, Mod-2, sh-1, and Hbb: 10, 22, and 2 involved, respectively, none of these markers, Mod-2 alone, and Mod-2 plus sh-1. When classified on this basis, as well as according to developmental stage at which homozygotes die, and by limited complementation results, the 34 independent mutations fell into 12 groups. From results of a full-scale complementation grid of all 435 possible crosses among 30 of the mutations, we were able to postulate an alignment of eight functional units by which the 12 groups fit a linear pattern. Abnormal phenotypes utilized in the complementation study were deaths at various stages of prenatal or postnatal development, body weight, and reduction or absence of various enzymes. Some of these phenotypes can be separated by complementation (e.g., there is no evidence that mitochondrial malic enzyme influences survival at any age); others cannot thus be separated (e.g., glucose-6-phosphatase deficiency and neonatal death). We conclude that all of the nonviable albino mutations are deficiencies overlapping at c, and ranging in size from 2cM to 6-11 cM. Since many of the combinations of lethals produce viable albino animals that resemble the standard c/c type, we conclude (i) that the c locus contains no sites essential for survival, and (ii) that viable nonalbino c-locus mutations are the result of mutations within the c cistron. Viable albinos (the majority of radiation-induced c-locus mutations) may be intracistronic mutations or very small deficiencies.

24334 (ORNL—5927, pp 127-128) **Genetic study on mutants that will provide model systems for skin carcinogenesis.** Stelzner, K.F. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Four dominant autosomal mutations affecting development of the skin and hair arose during mutation-rate experiments employing the specific-locus method or in stocks derived from such experiments. Because it appeared probable from the work of Fry and associates at this laboratory that these mutants might be useful for skin carcinogenesis studies, a genetic analysis was undertaken to determine the number of loci involved, their relationship to each other, and their relationship to the hairless locus, hr. This analysis showed that three of the mutations probably constitute an allelic series. These three have been given the symbols Frl/sup a/, Frl/sup b/, and Frl/sup c/. The Frl series shows no evidence of linkage with hr. The fourth mutation, Hr/sup n/, is a dominant and homozygous viable allele at the hr locus. With the possible exception of Frl/sup b/, all mutants were of spontaneous origin. Because of their unique characteristics, these new mutatants are of potential value as mouse model systems in studies of skin carcinogenesis and related areas of research.

24335 (ORNL—5927, pp 128-129) **Characterization of x-autosome translocations, and their use as tools to investigate gene inactivation.** Russell, L.B.; Cacheiro, N.L.A.; Montgomery, C.S.; Bangham, J.W. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Not long after the first mammalian X-autosome translocations [T(X;A)'s] were reported from our laboratory 23 years ago, investigations of these rearrangements provided the evidence on which the single-active-X-chromosome hypothesis was developed by us independently of Lyon's inactive X hypothesis. In the years since then, a number of additional T(X;A)'s have been recovered and studied, and we have recently summarized some of our voluminous data. Of at least 17 T(X;A)'s observed, 15 (including 11 that arose at Oak Ridge) have now been studied genetically and/or cytologically. All but one were induced by mutagens in postmeiotic germ-cell stages. Eight have involved Chromosome (Ch) 7, four Ch 4, and one each Chs 2, 11, 12, 16, and 17. While part of this nonrandomness of distribution results from bias of detection [most T(X;A)'s having been found in specific-locus experiments], some may be due to selection against T(X;A)'s involving certain autosomal regions. T(X;A)'s have been used as tools in developmental studies to investigate cytogenetic mechanisms, and to analyze gene action (e.g., local vs organismic). They can be used to enrich for specific X or autosomal DNA by flow sorting or by the use of cell hybrids.

24336 (ORNL—5927, pp 129-130) **Investigation of the causes of genetic male sterility.** Russell, L.B.; Cacheiro, N.L.A.; Larsen, M.M.; Montgomery, C.S. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Every one of 16 reciprocal X-autosome translocations [T(X;A)'s] reported to date produces sterility in heterozygous males. This sterility results from stoppage of spermatogenesis in pachytene, with occasional spermatocytes in some of the stocks

reaching metaphase I, particularly in males just past puberty. Our recent work has eliminated several of the hypotheses that have been proposed to explain the male sterility.

24337 (ORNL—5927, pp 130-131) **Meiotic studies of rearrangements by synaptonemal complex analysis.** Ashley, T.; Russell, L.B.; Cacheiro, N.L.A.; Russell, E.L. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

A number of chromosomal rearrangements of the mouse are being used in an ongoing study of meiotic mechanism, particularly the initiation, progression and maintenance of synapsis and the circumstances of X-Y pairing. Synaptonemal complexes of surface-spread spermatocytes of male mice heterozygous for rearrangements R2, R3, R5, or R6 have been examined by light and electron microscopy (LM and EM). All four of these rearrangements are reciprocal translocations between the X chromosome and Ch 7. Measurements of the lengths of all the chromosome axes involved in the translocation configurations, and of the extent of synapsis, were used to calculate the position of the break points of the four translocations. The breaks in Ch 7 were at 62, 70, 21, and 30% of the length of the chromosome (as measured from the centromere); in the X, they were at 27, 22, 83, and 75%, respectively. The phenomenon of nonhomologous pairing, found to occur in R2, R5, and R6, complicates LM analysis, but is easily recognized and interpreted in the EM study. In the case of R2 and R3, translocation quadrivalents are formed almost exclusively; but in R5 and R6, the frequency of quadrivalents was only 20 and 42%, respectively, with most of the rest of the associations being heteromorphic bivalents (7/sup X/-Y and X^{7}-7). In a synaptonemal-complex (SC) analysis of our tandem duplication in Ch 7, the SC's exhibit a characteristic loop, representing the unsynapsed portion of the duplication; but the loop disappears in later pachytene stages, as a result of synaptic adjustment. The length of the duplicated segment is 22% that of the normal Ch 7. Ends of the segment were mapped at 0.50 and 0.72 (from the centromere) in pachytene SC's, and at 0.48 and 0.71 in G-banded chromosomes, demonstrating strong parallelism between meiotic and mitotic chromosomes.

24338 **LTR-vectors.** Vande Woude, G.F.; McClements, W.L.; Oskarsson, M.K.; Blair, D.G. US Patent Application 6-279 443. 1 Jul 1981. 26p.

The patent application describes the production of vectors composed of portions of retrovirus, particularly of Moloney sarcoma virus DNA including the 'LTR' sequence which can activate genes and additional viral sequences which can 'rescue' these genes into a replicating virus particle.

24339 **Transposable elements and genetic instabilities in crop plants.** Burr, B.; Burr, F. (Brookhaven National Lab., Upton, NY). *Stadler Genetics Symposia;* **13**: 115-126(1981).

Transposable elements have long been associated with certain unstable loci in maize and have been intensively studied by McClintock and others. It is known that a transposable element can control the expression of the structural genes at the locus where it resides. These controlling elements in maize are now beginning to be studied at the molecular level. Using recombinant molecular probes we have been able to describe the changes induced by the controlling element Ds at the shrunken locus. Ds elements appear to be large and dissimilar insertions into the wild-type locus - two elements actually map within the transcribed region of the gene. Genetic instabilities have been described in other economically important plants but the bases for these phenomena have not been understood. We believe that it is likely that some of these instabilities are the result of transposable element activity much as in the case of maize.

5505 Metabolism

REFER ALSO TO CITATION(S) 24461, 24462, 24464, 24473

24340 **(DOE/ER/12015—4) Studies of photosystem II using artificial donors. Progress report and renewal proposal. MML Proposal No. BI82-414.** Radmer, R. (Martin Marietta Labs., Baltimore, MD (USA)). Oct 1982. Contract AC02-82ER12015. 8p. NTIS, PC A02/MF A01. Order Number DE83008387.

Progress is reported on the following studies: (1) studies using hydroxylamine and hydrazine; (2) studies using substituted hydroxylamines and hydrazines; (3) studies using hydrogen peroxide; (4) studies on bound H_2O in S_2 and S_3; (5) role of β-carotene in electron transfer between Z and P680; (6) oxidation of Mn^{2+} by tris-treated chloroplasts; and (7) spectroscopic studies of PS II reactions with NH_2OH analogs. (ACR)

5506 Medicine

24341 **(HRP—0904430/6) Radiation therapy: model standards for determination of need.** Lagasse, L.G.; Devins, T.B. (Sidney Farber Cancer Center, Inc., Boston, MA (USA)). Mar 1982. 57p. NTIS, PC A04/MF A01.

Contents: Health planning process; Health care requirements (model for projecting need for megavoltage radiation therapy); Operational objectives (manpower, megavoltage therapy and treatment planning equipment, support services, management and evaluation of patient care, organization and administration); Compliance with other standards imposed by law; Financial feasibility and capability; Reasonableness of expenditures and costs; Relative merit; Environmental impact.

24342 **(LBL—13091) Detectors, sampling, shielding, and electronics for positron emission tomography.** Derenzo, S.E. (Lawrence Berkeley Lab., CA (USA)). Aug 1981. Contract W-7405-ENG-48. 9p. (CONF-811103—34). NTIS, PC A02/MF A01. Order Number DE81029858.

From ANS winter meeting; San Francisco, CA, USA (29 Nov 1981).

A brief discussion of the important design elements for positron emission tomographs is presented. The conclusions are that the instrumentation can be improved by the use of larger numbers of small, efficient detectors closely packed in many rings, the development of new detector materials, and novel electronic designs to reduce the deadtime and increase maximum event rates. (ACR)

24343 **(N—82-20835) Effect of radioprotective agents on reactivity to space flight factors.** Vorobyev, Y.I.; Yefimov, V.I.; Karsanova, S.K. (Joint Publications Research Service, Washington, DC (USA)). Mar 1982. 14p. NTIS, PC A07/MF A01.

In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) p 1-14 (SEE N82-20834 11-51) Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 4-12 REFS.

The experimental and clinical data published during the last 15 years that concern the effect of radioprotector drugs on the reactivity of organisms exposed to acceleration, vibration, motion sickness, hypodynamics, hypo- and hyperoxia are summarized and discussed. It is concluded that it is possible to use drugs to enhance radioresistance during flights however, one should proceed with some caution in recommending a specific inflight radioprotective agent. The results of studies with the participation of man confirmed the assumption that intake of the short-acting radioprotector ambratin and prolonged-action protector amitetravit has no adverse effect on the human body according to tests with endurance of motion and prolonged accelerations. For this reason, they were recommended as radioprotective agents for use during manned flights aboard the Soyuz series of spacecraft.

24344 **(PB—83-141911) The radiographic examination of the colon.** Hendrix, T.R.; Saba, G.P. II. (Johns Hopkins Univ., Baltimore, MD (USA). School of Medicine). 3 Sep 1980. 15p. NTIS, PC A02/MF A01.

To provide medical and scientific background on certain selected technologies generally considered to be of particular signifi-

cance, the National Center for Health Care Technology commissioned a series of overview papers, one of which is entitled 'The Radiographic Examination of the Colon.' These overviews are likely to be of most immediate interest to clinicians and biomedical scientists; they also may provide valuable background for assessments undertaken by the Center and for exploring the broad societal implications of health care technologies. Barium enema is the most available and widely used technique for examining the colon. It is often a routine part of the gastrointestinal work-up regardless of the suspected basis, anatomical or functional, of the patient's symptoms. Indeed, common practice is not to entertain a diagnosis of functional disorder before excluding all reasonable possibility of an anatomical abnormality. Barium enema is one of the most frequently ordered radiographic examinations.

24345 **Release of zinc from disposable coils during hemodialysis.** Bogden, J.D.; Zadzielski, E.; Weiner, B.; Oleske, J.M.; Aviv, A. (College of Medicine and Dentistry of New Jersey, Newark). *Trace Substances in Environmental Health;* **15**: 121-130(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

In a prior study, we demonstrated that certain disposable coils are contaminated with zinc and release substantial quantities of Zn during hemodialysis, producing high post-dialysis plasma Zn concentrations. The present investigation was designed to monitor plasma and dialysis fluid Zn and copper throughout dialysis and to estimate patient Zn and Cu uptake. Venous plasma, arterial plasma and coil chamber fluid were sampled periodically throughout dialysis; trace metal concentrations were determined by flame atomic absorption spectrophotometry. Release of considerable quantities of Zn from the coils into the dialysis fluid, with uptake into the patient's plasma, was found. Approximately one-half of the plasma Zn uptake occurred in the first 45 minutes. Coils from different lots released significantly different quantities of Zn. Patient uptake of Zn ranged from 3.2 mg-23.0 mg, with a mean of 15.0 +- 6.1 mg. Copper release and uptake was low. It is recommended that quality control of the Zn content of some types of disposable coils be initiated. The results suggest that Zn release from disposable dialysis coils should be assessed before recommending that hemodialysis patients receive Zn supplements.

24346 **Facility for radiographic diagnosis.** Grady, J.K. German(FRG) Patent 3,031,458/A/. 26 Mar 1981. 15p. (In German).

The patient is placed on a table in a fixed position in such manner that his heart lies in an isocenter formed by the intersection of two axes of radiation between an X-ray tube with its radiation image amplifier each. For taking a picture of the ventricle of the heart both axes are at right angles. For making a heart angiography one of the X-ray tubes can be turned by 360° about a central axis.

24347 **Facility for positron computed tomography.** Thompson, C.J. German(FRG) Patent 3,007,814/A/. 19 Mar 1981. 21p. (In German).

For positron computed tomography two or more rings of scintillation detectors are used by which three or more sections of the object may be determined at a time. The rings are placed in parallel planes having got some distance from each other, axially movable collimator rings being provided for. Each collimator can be moved towards the opposite collimator and towards a central collimator which also is ring-shaped and is placed between the rows of detectors. The external and internal collimator are used for data selection and image-forming.

5507 Microbiology

REFER ALSO TO CITATION(S) 23022, 24272, 24273, 24284, 24287, 24310, 24311, 24312, 24313, 24314, 24375, 24380, 24413

24348 **(CONF-800879—2) Organisms and compounds of unnatural isotopic composition in NMR.** Katz, J.J.; Crespi, H.L. (Argonne National Lab., IL (USA)). 1980. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008536.

From ISMAR-AMPERE conference; Delft, Netherlands (Aug 1980).

It is now entirely practical to grow living organisms in which the ^{1}H, ^{12}C, ^{14}N and O^{16} normally present can be almost entirely replaced, singly or in combination by the heavy stable isotopes ^{2}H (99.7%), ^{13}C (99%), ^{15}N (95%) and (in principle) ^{17}O. Such organisms of unnatural isotopic composition serve as a source of ribosomes, membrane preparations, biopolymers and other systems and compounds of biological interest whose unusual isotopic compositions may greatly facilitate the application of magnetic resonance techniques.

24349 **(CONF-820220—2) Concentration, serotypic profiles, and infectivity of Legionnaires' Disease bacteria populations in cooling towers.** Tyndall, R.L. (Tennessee Univ., Knoxville (USA). Dept. of Zoology and Entomology; Oak Ridge National Lab., TN (USA)). 1982. 21p. NTIS, PC A02/MF A01. Order Number DE83007511.

From February session of the Cooling Tower Institute; Houston, TX, USA (1 Feb 1982).

Portions are illegible in microfiche products.

At the Philadelphia American Legion Convention in 1976 nearly two hundred people developed pulmonary infection. Of these, twenty-eight died. The causative bacterial agent was subsequently isolated and identified as a previously undiscovered human pathogen, that is, Legionnaires' Disease Bacterium (LDB). Currently it is estimated that over one hundred thousand cases of Legionella occur annually. Cooling towers have been shown to be the source of LDB in some of the outbreaks. Ecological information indicates that the bacteria are present in many natural waters. Moreover, there is strong evidence that algal products can stimulate the growth of LDB. Because cooling tower environments may be conducive for growth and/or dispersal of LDB, a survey of both industrial and air-conditioning cooling towers for the presence of LDB was undertaken.

24350 **Influence of method on the apparent size distribution of bacterioplankton cells: epifluorescence microscopy compared to scanning electron microscopy.** Fuhrman, J.A. (Univ. of California, San Diego, La Jolla). *Marine Ecology: Progress Series;* **5**: 103-106(30 Apr 1981). Contract AM03-76SF00010.

Size distributions of unattached marine bacterioplankton determined by epifluorescence microscopy were compared with those determined by scanning electron microscopy (SEM). Significant (up to 37%) and variable linear shrinkage occurred during preparation for SEM. Therefore, though far from perfect, epifluorescence microscopy of wet preserved cells is probably more accurate than SEM for determination of size and biovolume. Comparison of the distribution of bacterial size with literature data for the distribution of bacterial activity suggested that the small to medium sized bacteria (< 0.6 μm diameter) are much more active on a per unit volume basis, than larger bacteria.

24351 **Dissolved cyclic adenosine monophosphate (cAMP) in the sea and uptake of cAMP by marine bacteria.** Ammerman, J.W.; Azam, F. (Univ. of California, San Diego, La Jolla). *Marine Ecology: Progress Series;* **5**: 85-89(30 Apr 1981). Contract AM03-76SF00010.

Dissolved cyclic-3',5'-adenosine monophosphate (cAMP) was measured in coastal seawater. Concentrations of cAMP ranged from 1 to 35 x 10^{-12} M being greatest in nearshore surface samples and from early evening through early morning. Dissolved cAMP was rapidly taken up intact by natural populations of marine bacteria, evidently via high affinity transport systems. Much higher concentrations were found in sediments. Presumed sources of dissolved cAMP are planktonic organisms (bacteria, algae, zooplankton, etc.). cAMP was also measurable in the plankton. Uptake of cAMP from seawater apparently increases the intracellular concentration of cAMP in marine bacteria and thus may play a role in their metabolic regulation.

5509 Pathology

REFER ALSO TO CITATION(S) 24457, 24460, 24472

5510 Physiological Systems

REFER ALSO TO CITATION(S) 24323, 24464, 24470, 24471, 24472

24352 (ORNL—5927, pp 27-30) **Regulation of transport systems in cultured mammalian cells.** Cook, J.S.; Amsler, K.; Fishman, J.B.; Karin, N.J.; Pollack, L.; Shaffer, C.J. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Cells and whole organisms interact with their environment through their membranes, plasma membranes for cells and cellular epithelial membranes for the organism. As a protective measure, the lipid bilayer of the surface membrane serves as an effective barrier to most of the polar compounds that may be dissolved in the aqueous environment in which cells live. As a corollary, the dissolved substrates required by cells or organisms either for maintenance or for growth are commonly taken up by specific transport systems. The latter, in turn, are well regulated in terms of numbers of transporters, the affinities of the transporters, or their degree of coupling to metabolic systems. Our group has been studying various aspects of transport regulation in mammalian cells in relation to the requirements of the organism. Special emphasis is given to changes in these systems in response to growth stimuli, including the effects of tumor promoters.

5520 Public Health

REFER ALSO TO CITATION(S) 23831, 24246, 24296, 24297, 24298, 24299, 24349, 24458, 24459, 24461, 24463, 24467, 24468

24353 **Thoughts about revising the radiation regulations in drinking water concerned with natural radioactivity.** Cothern, C.R.; Lappenbusch, W.L. (Environmental Protection Agency, Washington, DC). *Trace Substances in Environmental Health;* **15**: 64-68(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The current regulations promulgated in 1976 for radioactivity in drinking water include maximum contaminant levels (MCL) for natural and man-made radioactivity. There are no known violations of the man-made standards while out of 61,000 public water supplies 400 to 800 have violations for radium and gross alpha concentrations. The revised regulations scheduled for proposal in 1982 to 1983 will reflect information published since 1976 and are expected to include a MCL for uranium. This paper discusses some of the topics being considered in developing these revised regulations.

5530 Agriculture And Food Technology

REFER ALSO TO CITATION(S) 23289, 24306, 24405

24354 **(TVA/ONR/LFR—82/8) User's manual for the Caretaker Information System. Version 1.2.** Purcell, J.E. (Tennessee Valley Authority, Norris (USA). Div. of Land and Forest Resources). Jun 1982. 51p. NTIS, PC A04/MF A01. Order Number DE83901679.

The Caretaker Information System is an interactive, microcomputer based, accounts receivable system for use by consulting foresters. It provides for the collection, processing, and reporting of information about the consultants' clients. The system gives the consultant the following: client account balances, an expenditure/income report, an income analysis report, client invoices, and mailing labels. Client information and transactions can be displayed on the CRT screen to quickly look up account records. Clients receive an end of year summary of all activity in their account to keep for their records and to assist in income tax reporting. The system provides the means to add, change, update, or delete information. The Caretaker Information System is designed to work on microcomputers with a CRT screen, floppy disk data storage, an 80 column printer, and the ability to run the COBOL program. A listing of tasks performed by the program is included. The forester makes a choice from among these functions.

24355 **(TVA/ONR/LFR—83/5) Activity-Reporting System User's Manual. Version 1.2.** Purcell, J.E. (Tennessee Valley Authority, Norris (USA). Office of Natural Resources). Nov 1982. 31p. NTIS, PC A03/MF A01. Order Number DE83901678.

The Activity Reporting System (ARS) is a computer-based information system for state service foresters and others who must keep detailed records of activities performed for individual clients. ARS allows the forester to daily record activities and then summarize these activities by client, forester, district, program, or project. The system records all necessary information for US Forest Service (USFS) reporting requirements. The computer asks the necessary questions to guide the forester through each procedure. Each procedure is explained in detail in this manual. ARS is designed to work on microcomputers with a CRT screen, floppy disk data storage, an 80-column printer, and the ability to run the COBOL program.

24356 **(TVA/ONR/LFR—83/7) User's Manual for the TVA Lumber Yield and Value File Utility Program. Version 1.0.** Bean, S.D. (Tennessee Valley Authority, Norris (USA). Div. of Land and Forest Resources). Nov 1982. 24p. NTIS, PC A02/MF A01. Order Number DE83901677.

The Lumber Yield and Value File Utility Program (LYVPFUTL) is designed to provide easy access to Lumber Yield and Value Program (LYVP) initialization files. Specifically, the LYVPFUTL permits a user to change the species that the LYVP recognizes, redefine the lumber price table, or examine the intermediate results of the Lumber Yield and Value Program during execution. The LYVPFUTL program does not process the field inventory data; that is the function of the Lumber Yield and Value Program. The LYVPFUTL is used to redefine the environment under which the LYVPFUTL program processes data. For example, a typical use of the LYVPFUTL program is to redefine the current lumber prices used in predicting lumber value.

56 BIOMEDICAL SCIENCES, APPLIED STUDIES

5601 Radiation Effects

REFER ALSO TO CITATION(S) 23820, 24248, 24404, 24417, 24736

24357 **(ABCC-TR—33-71) Breast cancer among atomic bomb survivors, Hiroshima and Nagasaki, 1950-1969. Pathologic features.** McGregor, D.H.; Land, C.E.; Choi, K.; Tokuoka, S.; Liu, P.I.; Wakabayashi, T.; Beebe, G.W. (Radiation Effects Research Foundation, Hiroshima (Japan); Radiation Effects Research Foundation, Nagasaki (Japan). Nagasaki Branch). Jun 1979. Contract AC01-76EV03161. 21p. NTIS, PC A02/MF A01. Order Number DE83008983.

Portions are illegible in microfiche products.

The pathologic features of breast carcinoma in 161 women in the JNIH-ABCC Life Span Study extended sample were studied for relation to radiation exposure at the time of the bomb (ATB). Approximately 7% of the cancers were noninfiltrating carcinoma, 47% were infiltrating duct carcinoma not otherwise specified, 21% infiltrating papillary duct carcinoma, 7% comedo carcinoma, 6% medullary carcinoma, 6% colloid carcinoma, 4% lobular carcinoma, and 2% sarcoma. There was no evidence of a radiation dose relationship for the proportion of any one histologic type. Various pathologic features examined in relation to radiation dose include the presence of more than one histologic type, the histologic grade (differentiation, pleomorphism, mitotic activity, nuclear hyperchromatism), lymphocytic and plasmacytic infiltration, fibrosis, necrosis, circumscription, calcification, distribution of metastases, local invasion (vascular, perineural, muscle, skin), and endocrine organ changes. Of these, the values for histologic grade, local invasion,

necrosis, circumscription, and calcification were lower for women exposed to 50 rad or more ATB than in those exposed to little or no radiation. Apparent histologic differences between breast carcinoma in Japanese and American women are discussed.

24358 **(AD-A—120667/1) Peptide-induced emesis in dogs: possible relevance to radiation-induced emesis. Final report Oct 80-Sep 81.** Carpenter, D.O. (New York State Dept. of Health, Albany (USA)). Sep 1982. 15p. NTIS, PC A02/MF A01.

Results of earlier investigators indicate that radioemesis is mediated by some humoral agent(s). Peptides are likely candiates since they exert a number of biological effects and are released from storage sites by various stimuli, including radiation. Peptides at various concentrations were injected singly intravenously into conscious dogs, and the dog's emetic response was observed. Of the peptides tested, neurotensin, angiotensin II, vasopressin, oxytocin, and TRH produced consistent emetic responses. Inhibition of drug-induced emesis was studied both centrally (chlorpromazine) and peripherally (domperidone) acting dopamine antagonists. Results indicate inhibition by chlorpromazine, which crosses the blood brain barrier, but only partial blockade by domperidone, which does not cross the blood brain barrier. Preliminary studies were conducted attempting to characterize types of receptors on area postrema neurons. Single-cell recordings from these neurons, challenged by iontophoretic administration of various neurotransmitters, show stimulation by glutamic acid and serotonin and inhibiiton by norepinephrine.

24359 **(AD-A—121701/7) Analysis of radiation exposure for troop observers, Exercise Desert Rock VI, Operation Teapot. Final report 1 Mar-15 Jul 80.** Goetz, J.; McGahan, J.; Kaul, D.; Weitz, R.; Klemm, J. (Science Applications, Inc., McLean, VA (USA)). 15 Jul 1980. 98p. NTIS, PC A05/MF A01.

The radiation doses to troop observers and volunteer observers for Exercise Desert Rock VI are reconstructed for each applicable shot of Operation Teapot (1955). Initial neutron and gamma radiation doses are determined from transport codes ATR4 and ATR4.1. Residual radiation contours and decay rates are established through a new automated procedure that utilizes raw data in regression analysis to fit space-time models. Troop operations data are combined with the radiological data to determine integrated dose. Uncertainties are calculated for each parameter. The volunteers received the highest observer--1.6 rem gamma and 4.5 rem neutron. The highest dose received by troop observers was 1.4 rem gamma and 1.4 rem neutron at Shot Tesla.

24360 **(AD-A—122204/1) Analysis of radiation exposure, 4th Marine Corps provisional atomic exercise brigade, exercise Desert Rock VII, Operation Plumbbob. Final report 1 Mar 80-15 Jun 81.** Frank, G.; Goetz, J.; Klemm, J.; Thomas, C.; Weitz, R. (Science Applications, Inc., McLean, VA (USA)). 15 Jun 1981. 78p. (SAI—82-504-WA). NTIS, PC A05/MF A01.

The radiation dose to Marine Brigade participants in Exercise Desert Rock VII (Operation Plumbbob, 1957) is reconstructed for each major brigade element. Although the exercise was centered primarily around Shot Hood after the Diablo misfire, there was limited participation in Shot Priscilla also. Moreover, the residual radiation from previous shots contributed to the total dose. Residual doses are determined through an automated procedure that utilizes raw survey data in modeling the radiation field, which is overlaid with specific troop activities to arrive at an integrated dose. Despite the lack of definitive troop activity information, the automated procedure facilitates an iterative process to correlate possible activities with those inferred from available dosimetry. The calculated doses to typical troops range from .58 rem to .66 rem. Other participants, notably officers, received higher recorded doses due to participation in Shot Priscilla. The calculated doses correlate well with available dosimetry. Rad-safe monitor teams were subjected to higher exposures due to their duties. This is evidenced by their total badge readings averaging 1.2 rem and ranging as high as 3 rem. Initial radiation and internal residual radiation exposures were insignificant.

24361 **(AD-A—122242/1) Operation TUMBLER-SNAPPER 1952. Technical report.** Ponton, J.; Maag, C.; Barrett, M.F.; Shepanek, R. (JRB Associates, Inc., McLean, VA (USA)). 14 Jun 1982. 220p. NTIS, PC A10/MF A01.

This report describes the activities of an estimated 10,600 DOD personnel, both military and civilian in Operation TUMBLER-SNAPPER, the third nuclear weapons testing series conducted at the Nevada Proving Ground. TUMBLER-SNAPPER consisted of eight nuclear tests conducted from 1 April to 5 June 1952. Activities engaging DOD personnel included Exercise Desert Rock IV programs, scientific experiments, and DOD support activities. Radiological safety criteria and procedures were established and implemented during Operation TUMBLER-SNAPPER to minimize participants' exposure to radioactivity.

24362 **(CONF-810153—4) Some aspects of radon and its daughter-products in man and his environment.** Rundo, J.; Markun, F.; Plondke, N.J.; Sha, J.Y. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83008616.

From 2. special symposium on natural radiation environment; Bombay, India (19 Jan 1981).

Portions are illegible in microfiche products.

A major but short-lived postprandial increase in the exhalation rate of radon by persons containing no radium was observed. The concentrations of radon and its short-lived daughter-products in houses was unusually high (> 5 to 10 pCi l^{-1}, $>$ 185 to 370 Bq m^{-3}) in some houses with unpaved crawl spaces, and with concrete basements. External counting of radon daughter-products in the residents of one of the radon-contaminated houses indicated that there may be interference with the assay of plutonium in the lungs of persons who live in those houses.

24363 **(CONF-8104153—4) Risk estimates for bone.** Schlenker, R.A. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 18p. NTIS, PC A02/MF A01. Order Number DE83008628.

From National Council for Radiation Protection symposium on control of radiation exposures; Washington, DC, USA (27 Apr 1981).

The primary sources of information on the skeletal effects of internal emitters in humans are the US radium cases with occupational and medical exposures to ^{226} ^{228}Ra and the German patients injected with ^{224}Ra primarily for treatment of ankylosing spondylitis and tuberculosis. During the past decade, dose-response data from both study populations have been used by committees, e.g., the BEIR committees, to estimate risks at low dose levels. NCRP Committee 57 and its task groups are now engaged in making risk estimates for internal emitters. This paper presents brief discussions of the radium data, the results of some new analyses and suggestions for expressing risk estimates in a form appropriate to radiation protection.

24364 **(CONF-8205170—1) Radium dial workers.** Rowland, R.E.; Lucas, H.F. Jr. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83008506.

From Conference on radiation carcinogenesis: epidemiology and biological significance; Washington, DC, USA (24 May 1982).

The population of radium dial workers who were exposed to radium 30 to 50 years ago are currently being followed by the Center for Human Radiobiology at the Argonne National Laboratory. It is not clear that radium has induced additional malignancies in this population, other than the well-known bone sarcomas and head carcinomas, but elevated incidence rates for multiple myeloma and cancers of the colon, rectum, stomach, and breast suggest that radium might be involved. Continued follow-up of this population may resolve these questions. Finally, the question of the effect of fetal irradiation on the offspring of these women remains to be resolved. No evidence exists to suggest that any effects have occurred, but there is no question that a chronic irradiation of the developing fetus did take place. No formal follow-up of these children has yet been initiated.

24365 **(DOE/EP—0040/1) Fourteenth annual report radiation exposures for DOE and DOE contractor employees - 1981.** (Pacific Northwest Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76RL01830. 57p. NTIS, PC A04/MF A01. Order Number DE83009170.

All Department of Energy (DOE) and DOE contractors are required by DOE Order 5484.1, Chapter IV, to submit occupational exposure records to a central repository. The data required includes a summary of whole-body exposures to ionizing radiation, a summary of internal depositions of radioactive materials above specified limits, and occupational exposure reports for terminating employees. This report is a summary of the data submitted by DOE and DOE contractors for 1981. A total of 82,873 DOE and DOE contractor employees were monitored for whole-body ionizing radiation exposures in 1981. In addition to the employees, 84,343 visitors were monitored. Of all employees monitored, 54.43% received a dose equivalent that was less than measurable, 44.04% a measurable exposure less than 1 rem, and 1.53% an exposure granter than 1 rem. the exposure received by 88.14% of the visitors to DOE facilities was less than measurable. Only 11.85% of the visitors received a measurable exposure less than 1 rem, and 0.0% of the visitors received an exposure greater than 1 rem. No employees or visitors received a dose equivalent greater than 5 rem. The collective dose equivalent for DOE and DOE contractors employees was 6,902 person-rem. The collective dose equivalent for visitors was 579 person-rem. The total dose equivalent for employees and visitors combined was 7,481 person-rem. The average dose equivalent for all individuals (employees and visitors) monitored was 45 mrem and the average dose equivalent for all individuals who received a measurable exposure was 157 mrem. The highest average dose equivalent was observed for employees monitored at fuel processing facilities (342 mrem) and the lowest among visitors (7 mrem) to DOE facilities. These averages are significantly less than the DOE 5-rem/year radiation protection standard for whole-body exposures.

24366 **(DOE/EV/02828—T1) Area program in population genetics. Final report, November 1, 1975-August 31, 1982.** Chu, E.H.Y.; Gershowitz, H.; Meisler, M.H.; Mohrenweiser, H.W.; Neel, J.V.; Rothman, E.D.; Sing, C.S. (Michigan Univ., Ann Arbor (USA)). 1982. Contract AC02-76EV02828. 32p. NTIS, PC A03/MF A01. Order Number DE83008352.

Research results are summarized for the following task areas: (1) Amerindian mutation rates; (2) pilot study of monitoring populations for the frequency of mutation; (3) interdigitation with the biochemical genetics study of the Radiation Effects Research Foundation (Hiroshima, Japan); (4) intraindividual variation in erythrocyte blood group antigens as indicators of somatic mutation; (5) in vitro studies of somatic cell mutation rates; (6) development of approaches to the study of mutation rates; and (7) statistical problems associated with the study of mutation and selection. (ACR)

24367 (DOE/EV/04326—4, pp 14-28) **Preliminary analysis of data obtained from participation in the IAEA human-mock plutonium intercalibration experiment.** 1982. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

In In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.

In order to verify the validity of the LLNL phantom-derived calibration values for the in vivo measurement of Pu-239 in the lungs, an experiment was developed to provide supplemental information to a previous trial in which volunteer subjects inhaled known quantities of Pd-103. Niobium-92m was chosen for the current experiment because of its similar energy x-ray emission to Pu-239, its short half-life, and its abundance. This paper reports on measurements made on one individual. (KRM)

24368 (DOE/EV/04326—4, pp 38-41) **Application of a multiple least-squares regression program to dual energy NaI-CsI(T1) measurements.** 1982. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

In In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.

In conjunction with the development of an optimum background subtraction routine, a multiple least-squares regression program for simultaneous utilization of both the NaI(T1) and CsI(T1) energy ranges of a dual anti-coincidence detection system was applied. To experimentally evaluate the program for whole body counting purposes, an Am-241 contaminated subject was measured in the whole body counter using the standard three phoswich detector array surrounding the head. (KRM)

24369 (DOE/EV/04326—4, pp 42-50) **Body burden estimation of P-32 by measurement and calibration of Bremsstrahlung radiation produced in the head.** 1982. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

In In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.

In vivo detection systems such as the low-energy NaI-CsI(T1) detectors are sensitive to not only incident photons but also to beta interactions either directly through their interaction in the NaI crystal matrix or indirectly through detection of bremsstrahlung radiation. This paper examines the sensitivity of the detection system to the beta interaction from measurement of two individuals who were internally contaminated with P-32. (KRM)

24370 **(KFK—3360) Investigations on the biological behaviour and the decorporation of ^{234}Th in the rat.** Peter, E. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Genetik und Toxikologie von Spaltstoffen; Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Bio- und Geowissenschaften). Jul 1982. 131p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750141.

Thesis.

In this work the biological behaviour of ^{234}Th in the rat has been studied as function of mass, chemical form and route of entry. Further it was investigated if there is a correlation between iron metabolism and distribution of ^{234}Th in the organism. The mobilization of ^{234}Th with Ca- und Zn-DTPA as well as with other chelators and their combinations with DTPA has been determined as basis for acceptable therapeutic procedures for decorporation.

24371 **(N—82-20829) Ultraviolet radiation environment of pollen and its effect on pollen germination. Final report.** (Utah State Univ., Logan (USA)). Dec 1981. 50p. NTIS, PC A18/MF A01.

In its Higher Plant Response to Elevated Ultraviolet Irradiance 50 p (SEE N82-20828 11-51) REFS.

The damage to pollen caused by natural ultraviolet radiation was investigated. Experimental and literature research into the UV radiation environment is reported. Viability and germination of wind and insect pollinated species were determined. Physiological, developmental, and protective factors influencing UV sensitivity of binucleate, advanced binucleate, and trinucleate pollen grains are compared.

24372 **(N—82-20830) Protective mechanisms and acclimation to solar ultraviolet-b radiation in oenothera stricta. Final report.** Robberecht, R.; Caldwell, M.M. (Utah State Univ., Logan (USA)). Dec 1981. 59p. NTIS, PC A18/MF A01.

In its Higher Plant Response to Elevated Ultraviolet Irradiance 59 p (SEE N82-20828 11-51) REFS.

Plant adaptations ameliorating or repairing the damaging effects of ultraviolet-B (UV-B) radiation on plant tissue were investigated. The degree of phenotype plasticity in UV protective mechanisms and acclimation in relation to the natural solar UV-B radiation flux and in an enhanced UV-B irradiance environment was also examined. Mechanisms by which plants avoid radiation, adaptations altering the path of radiation incident on the leaf, and repair processes were considered. Attenuation of UV-B by tissues, UV-B irradiation into the leaf, and the effects of UV-B on photosynthesis were investigated.

24373 **(N—82-20831) Action spectra for photosynthetic inhibition. Final report.** Caldwell, M.M.; Flint, S.; Camp, L.B. (Utah State Univ., Logan (USA)). Dec 1981. 20p. NTIS, PC A18/MF A01.

In its Higher Plant Response to Elevated Ultraviolet Irradiance 20 p (SEE N82-20828 11-51) REFS.

The ultraviolet action spectrum for photosynthesis inhibition was determined to fall between that of the general DNA action spectrum and the generalized plant action spectrum. The characteristics of this action spectrum suggest that a combination of pronounced increase in effectiveness with decreasing wavelength, substantial specificity for the UV-B waveband, and very diminished response in the UV-A waveband result in large radiation amplification factors when the action spectra are used as weighting functions. Attempted determination of dose/response relationships for leaf disc inhibition provided inconclusive data from which to deconvolute an action spectrum.

24374 **(NASA-CR—167538) Higher plant response to elevated ultraviolet irradiance. Final report.** Caldwell, M.M. (Utah State Univ., Logan (USA)). Dec 1981. 425p. NTIS, PC A18/MF A01.

The effect of ultraviolet irradiation on pollen germination, ultraviolet action spectra influencing photosynthesis, and plant adaptations to ultraviolet-B radiation are reported.

24375 (ORNL—5927, pp 25-26) **Respiration shutoff in Escherichia coli and Salmonella typhimurium after far-uv irradiation.** Swenson, P.A.; Riester, L. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

An important consequence of far ultraviolet (254 nm) irradiation (uv) damage to the DNA of Escherichia coli is cessation of respiration. The shutoff, which occurs about 60 min after exposure to uv, is dependent upon protein synthesis and upon the $recA^+$ and $lexA^+$ gene products. Other so-called rec/lex responses caused by damaged DNA include error-prone repair (as indicated by mutagenesis) and induction of lambda prophage. Our objective is to understand the genetic and biochemical bases of the shutoff process and its control.

24376 (ORNL—5927, pp 54-60) **Induction of chromosome aberrations, sister chromatid exchanges and specific locus mutations by radiation and chemicals, and the application of the studies to population monitoring and risk estimation.** Preston, R.J.; O'Neill, J.P.; Au, W.W.; Gooch, P.C.; Ho, T.; Luippold, H.E.; Payne, H.S.; Heartlein, M.W. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The major portion of the research of the Mammalian Cytogenetics Group can be considered to be directed towards estimating the genetic risk, and potentially the carcinogenicity, of radiation and chemical exposures to man. The approach taken is to attempt to determine the mechanism of induction of chromosome aberrations, sister chromatid exchanges and specific locus mutations, and to apply the information obtained to the interpretation of data from currently used assay systems, or for the development of new, more sensitive, or more predictive, assays. This report is divided into several sections, each one representing a separate series of experiments. There is a logical progression to the sections, and there is a clear relationship between them. The sections are: (1) x-ray-induced chromosome aberrations and the involvement of repair of DNA base damage; (2) hypothesis for the mechanism of induction of chromosome aberrations; (3) the induction of chromosome aberrations in lymphocytes from Down's syndrome individuals; (4) the induction of chromosome aberrations by chemical agents; (5) interactive effects of radiation and chemical agents; (6) risk estimation and population monitoring; (7) the mechanism of induction of sister chromatid exchanges and specific locus mutations; and (8) studies with a transplantable mouse myeloid leukemia - an animal model. The intention of these studies is to improve our ability to extrapolate from data obtained with laboratory animals to the likely outcome in man, in order to provide estimates of the genetic, and potentially the carcinogenic, risk to man from exposures to radiation and chemical agents. There are several studies that have been recently initiated but are not reported here because of limited results so far. These particularly involve the development or improvement of assay systems to provide a greater predictive value or greater sensitivity.

24377 (ORNL—5927, pp 66-67) **Genetic analysis of DNA repair in man with cell hybrids.** Regan, J.D.; Dunn, W.C. Jr.; Francis, A.A.; Lalley, P.A.; Diaz, J.A. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The long-range goal of this project is to investigate the expression and individual genetic components involved in the repair of DNA damage and to localize the genes involved in this complex system to specific human chromosomes. Such an elucidation of the genetic basis for the repair of DNA damage caused by physical or chemical agents is fundamental if we are to understand its pivotal role in carcinogenesis and mutagenesis. We have employed man / sup x/mouse somatic cell hybrids as our experimental system and bromodeoxyuridine photolysis, radiochromatography and molecular weight analysis as our assays for DNA repair to pursue this project. The use of somatic cell hybrids allows for the mapping of genes to specific human chromosomes and the genetic dissection of this polygenic system due to the isolation of its component parts as a result of the preferential segregation of human chromosomes in proliferating human /sup x/mouse somatic cell hybrids. Five different human cell lines derived from unrelated individuals normal for the ability to repair uv-induced DNA damage were utilized in this study. The human cells included three fibroblast lines and two lymphoblastoid lines. The parental mouse cell lines consisted of the RAG line, which is deficient for hypoxanthine phosphoribosyltransferase ($HPRT^-$) and B82, a line which lacks thymidine kinase (TK^-).

24378 (ORNL—5927, pp 68-69) **Genetic dissection of DNA repair in xeroderma pigmentosum cells.** Lalley, P.A.; Diaz, J.A.; Regan, J.D.; Dunn, W.C. Jr.; Francis, A.A. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The human skin disease, xeroderma pigmentosum (XP), demonstrates direct linkage between defective repair of damaged DNA, induction of mutations and induction of cancers. Studies utilizing the fusion of XP cells from unrelated patients have indicated that excision defective cells can be classified into at least seven different complementation groups designated A through G. This genetic heterogeneity in XP is perplexing since the biochemical lesion is thought to be in the uv endonuclease which initiates excision of uv-induced pyrimidine dimers in DNA. An elucidation of the basis for the genetic heterogeneity of XP is necessary if the functional relationships between DNA repair, mutagenesis, cacinogenesis, and risk assessment are to be fully understood and if xeroderma pigmentosum is to serve as a model system for such studies. Therefore, the specific objectives of this project are to (a) determine the genetic basis of the heterogeneity in XP complementation groups; (b) determine the number of different genes which may be involved in the expression of the xeroderma pigmentosum phenotype; (c) determine the chromosomal location of the gene(s) responsible for XP; and (d) determine the specific genetic contribution made by mouse cells to the XP cells which results in genetic complementation of their DNA repair capability. These studies were pursued using our ability to generate and genetically analyze man x mouse somatic cell hybrids for the presence of each human and mouse chromosome and the ability to repair DNA damage. The assays for DNA repair include (a) bromodeoxyuridine photolysis, (b) radiochromatography, and (c) molecular weight analysis. The use of somatic cell hybrids makes it possible to determine gene-chromosome assignments, to dissect this complex polygenic system by isolating its component parts and to investigate the genetic basis for complementation of defective repair in XP cells.

24379 (ORNL—5927, pp 72-76) **Mammalian biochemical genetics.** Popp, R.A.; Skow, L.C.; Popp, D.M.; Bailiff, E.G. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The principal aim of this program is to evaluate hazards to humans of exposure to nuclear and chemical by-products of energy production. Mice are used as experimental animals, and the data ob-

tained must be extrapolated to man. The studies can be divided into four general areas of research: (1) comparative mechanisms of mutations induced in germinal cells by irradiation and chemicals; (2) genetic regulation of gene expression and the organization of genetic information; (3) pathophysiological effects of induced mutations; and (4) development of tests to compare toxicity and mutation induction in vivo.

24380 (ORNL—5927, pp 79-80) **Microbial mutagenesis and cell division.** Adler, H.I.; Carrasco, A.; Nagel, R.; Gill, J.S.; Crow, W.D. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Our group has been pursuing three related objectives. The first of these is a study of a mechanism by which the bacterium Escherichia coli repairs radiation-induced damage. In particular, we have observed that cells of certain strains of this bacterium, mutant at the lon locus, can be restored to viability after exposure to ionizing radiation if they are incubated in a nutrient medium to which a preparation of partially purified bacterial membranes has been added. These preparations stimulate division by producing chemical alterations in the nutrient medium and simultaneously creating a highly anaerobic environment. A second objective of the group was to make use of lon mutants for a rapid, sensitive, and inexpensive assay for chemical mutagens. Cells of lon mutants form long multinucleate filaments if exposed to a variety of agents that react with DNA. These filaments can readily be observed microscopically 2 to 3 h after exposure to the suspect agent. A third objective of our group has been to make use of the oxygen reducing properties of bacterial membrane preparations to stimulate the growth of anaerobic bacteria. Our general goal is to develop basic microbiological techniques that will facilitate the application of genetic manipulation methods to important anaerobic species. To this end, we have developed a method, based on the use of membranes, that allows us to grow liquid cultures of Clostridium acetobutylicum from very small inocula to high titers without elaborate chemical or physical methods for excluding oxygen. We have also developed efficient methods for plating this bacterium that do not require the use of anaerobic incubators.

24381 (ORNL—5927, pp 80-83) **Genetics of repair of radiation damage to DNA in bacteria.** Billen, D.; Hadden, C.T. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The goal of this project is to study the consequences to bacterial DNA of damage by radiation and chemical agents. By correlating the extent of physical and biological damage to DNA, as expressed in various mutants defective in specific DNA repair pathways, we hope to determine mechanisms of biological inactivation of DNA and ways in which the damage can be repaired. We have measured physical damage to DNA in Bacillus subtilis and Escherichia coli by use of alkaline sucrose gradient centrifugation, which indicates the distance between breaks or alkali-labile lesions in single strands of DNA. Biological damage is measured by loss of viability or by loss of transforming activity in treated DNA from B. subtilis, and by the production of sites for DNA repair synthesis by DNA polymerase I (Pol I) in toluene-treated E. coli. We have investigated effects of ultraviolet light (both far-uv and near-uv), ionizing radiation, and selected chemical agents, in the presence or absence of sensitizing or protective agents. A major goal was to characterize DNA repair processes in vivo in B. subtilis. A number of radiation-sensitive mutants were studied, with the result that we have learned a great many details about the repair of DNA in uv-irradiated cells: We have now also studied the induction of methyltransferase in B. subtilis exposed to low concentrations of N-methyl-N'-nitro-N-nitrosoguanidine (MNNG). In collaboration with Sankar Mitra and R.S. Foote (Biology Division), we have shown that the basal level of methyltransferase in B. subtilis is about ten-fold higher than in E. coli and that there is about a ten-fold increase during adaptation. Our future studies will focus on the radioprotective effects of alcohols that act as OH radical scavengers but also react to irradiation by the formation of a radical on the carbon alpha to the hydroxyl.

24382 (ORNL—5927, pp 95-96) **Specific-locus mutation frequencies in mouse stem-cell spermatogonia at very low radiation dose rates, and their use in the estimation of genetic hazards of radiation in man.** Russell, W.L.; Kelly, E.M. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Experiments were undertaken to augment the information on the lowest radiation dose rates feasible for scoring transmitted induced mutations detected by the specific-locus method in the mouse. This is the type of information most suitable for estimating genetic hazards of radiation in man. The results also aid in resolving conflicting possibilities about the relationship between mutation frequency and radiation dose at low dose rates.

24383 (ORNL—5927, pp 106-107) **Studies on the induction of dominant skeletal mutations by radiation.** Selby, P.B.; McKinley, T.W. Jr.; Raymer, G.D.; Lee, S.K. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The non-breeding-test methods are being employed in analyzing the induction of dominant skeletal mutations by several radiation treatments. Our two-fold purpose is (a) to test the methods, and (b) to determine how well specific-locus mutation-rate results predict the amount of induced damage. Male mice of the inbred 101 strain were irradiated with either 300 R, 600 R, or 100 R + 500 R (24 h between fractions) of acute (85 to 93 R/min) X radiation. Other male mice of this strain were irradiated with 600 R of gamma radiation delivered at 0.005 R/min (chronic). The control frequency of presumed mutations is 5/1599. In the experimental groups, only results on stem-cell spermatogonia are reported here. The presumed mutation frequencies in the 300-R acute, 600-R acute, 100 R + 500 R, and 600-R chronic groups were 0/388 (0%), 10/732 (1.4%), 7/448 (1.6%), and 2/178 (1.1%), respectively. In both the 600-R acute and 100 R + 500 R groups, the frequencies of induction are statistically significantly higher than the control frequency. The indices of mutation (experimental minus control) in the control, 300-R acute, 600-R acute, 100 R + 500 R, and 600-R chronic experiments are 0%, 0.7%, 2.0%, 4.4%, and 2.7%, respectively. The indices at 600-R acute and 100 R + 500 R are both statistically significantly higher than that at 600-R acute. With regard to risk estimation, the most important dose group in our current experiments is the 600-R chronic exposure. High priority will be given to building up the size of that group in order to obtain a reliable estimate of damage.

24384 (ORNL—5927, pp 111-113) **Radiation induction of heritable translocations in mice.** Generoso, W.M.; Bandy, J.A.; Cain, K.T.; Cornett, C.V. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982 .

Although heritable translocations are an important endpoint for the assessment of genetic risk from radiation, there has been a serious information gap with regard to their induction in spermatogonial stem cells, the most important cell stage for risk considerations. This led to uncertainty in estimating the magnitude of risk per unit exposure. Further, the relationship between the frequency of reciprocal exchanges scored by cytological analysis of the exposed male's meiocytes and the frequency of those transmitted to first-generation offspring could not be established. In order to fill in these gaps, we conducted two radiation studies on spermatogonial stem cells in which heritable and cytologically detected translocations were scored in parallel. These two studies are described. The data are by far the most extensive ones available for heritable translocation induction in spermatogonia stem cells. They show a lack of consistency between cytologically and genetically scored translocations indicating the inadequacy of using cytological data in estimating the transmissable frequency. With respect to heritable translocations, the linearity of the rising portion of the dose-effect curve and the additivity of effects observed in the fractionation experiment allow us to estimate directly the number of transmissible translocations expected per unit exposure.

24385 (ORNL—5927, pp 136) **Utilization of critical periods during development to study the effects of low levels of environmental agents.** Russell, L.B. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Our development of the homeotic-shift method as a sensitive and quantitative prescreen for teratogenesis has illustrated the advantages of using sensitive subpopulations. We have surveyed the teratology literature, particularly with regard to radiation, and find that the frequent lack of definition of subpopulations has led to a loss in sensitivity in the measurement of risk. An example is provided by the microcephaly data for Hiroshima. When we focused on the data for exposures during weeks 6 to 11 of pregnancy, the plot showed a steep dose-response curve (albeit with wide error bars due to the smallness of the samples). By contrast, the plot for exposure at any time during pregnancy (with different mixes of stages at each dose point) indicates a much shallower curve, of different shape at the lower end. Extrapolation to low doses could presumably be different from the two tabulations. This epidemiological study was a very large one, and the sample size and dose range are not likely to be duplicated for other agents. It is thus improbable that one will be able to deduce, from human data alone, critical periods for other endpoints. If one cannot do so - and therefore has to work with an array of exposed stages - the low-dose extrapolation will always be an underestimate as far as the real sensitive subpopulation is concerned. For experimental studies, careful definition of critical periods in the development of selected characters can result in systems that may be highly useful in studying risk at low levels of exposure.

24386 (ORNL—5927, pp 160-161) **Radiation immunology.** Perkins, E.H.; Glover, P.L. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The purpose of this research is to define the role of immunodepression in radiation-induced carcinogenesis. Two models of leukemogenesis, thymic lymphoma and myeloid leukemia, appear particularly suited for these immuno-biological investigations. Efforts focus on determining (1) if the inherent acute immunodepression is a critical obligatory component in the pathogenesis of these radiation induced leukemias, (2) the significance of autogenous immunity in the age related resistance to radiation leukemogenesis, (3) if tumor induction can be restricted by immunologic manipulation (immunoregulation), (4) the relationship between immunocompetence and target cell susceptibility, and (5) the elimination of susceptible target cells, thereby interrupting the pathogenic process.

24387 (ORNL—5927, pp 171-175) **Molecular genetics of carcinogenesis.** Yang, W.K.; Tennant, R.W.; Boone, L.R. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The specific aims of our research are to understand the molecular mechanism of gene transposition in relation to cancer and to elucidate the effects of various environmental agents on this mechanism. Particular emphasis has been placed on murine leukemia-related retroviruses as an experimental model. Currently, three major research projects have been developed to investigate, respectively, the etiologic role of a particular retroviral genome in radiation-induced myelogenous leukemias, the novel forms of chromosomal genes with proviral DNA structure, and host gene control of retroviral gene integration and expression.

24388 (ORNL—5927, pp 190-199) **Radiation carcinogenesis.** Ullrich, R.L.; Fry, R.J.M.; Ley, R.D.; Storer, J.B.; Adams, L.M.; Bowles, N.D.; Ethier, S.P.; Jernigan, M.C.; Lyon, L.L.; Satterfield, L.C. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The research efforts of the ionizing radiation carcinogenesis program consist of studies on neutron carcinogenesis, time-dose relationships, the role of host factors in radiation carcinogenesis, and the carcinogenic interactions of radiation and chemicals. These problems are being pursued with in vivo studies as well as in vitro and in vivo/in vitro approaches. A common theme among all of these studies is the examination of mechanisms and the establishment of general principles which may allow a better understanding of the risks to humans from radiation exposure. Data from all of these studies are also being used to examine more direct methods of extrapolation of animal data to human risks. The program in ultraviolet radiation carcinogenesis (UVR) is concerned with the following studies: (i) development of model systems, methods and background information that is necessary for designing quantitative UVR carcinogenesis experiments; (ii) the role of interactions of UVR and chemicals; and (iii) interactions between ionizing and ultraviolet radiation in skin carcinogenesis.

24389 (PB—83-139428) **Review of uranium miners study and statements of outstanding problems. Technical report.** (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Jan 1962. 20p. NTIS, PC A02/MF A01.

A statement on the overall problems surrounding research by the Public Health Service (PHS) into the effects of uranium mining is presented. The history of uranium mining research conducted by the PHS to date, a pertinent Governors' Conference, and organization of the research are discussed. The present status of the uranium miners study is surveyed. The authors conclude that additional uranium mining research is warranted, subject to certain general modifications.

24390 (PB—83-141903) **An overview of dental radiology: a primer on dental radiology.** Manny, E.F.; Carlson, K.C.; McClean, P.M.; Ra1hlin, J.A.; Segal, P. (National Center for Health Care Technology, Rockville, MD (USA)). 7 Nov 1980. 69p. (NCHSR—82-89). NTIS, PC A04/MF A01.

To provide medical and scientific background on certain selected technologies generally considered to be of particular significance, the National Center for Health Care Technology (NCHCT) has commissioned a series of overview papers. This is one of several projects entered into jointly by the Bureau of Radiological Health (BRH) and NCHCT relating to the use of radiation for health care. Dental radiation protection has been a long-time interest of BRH. Both past and on-going efforts to minimize population radiation exposure from electronic products have included specific action programs directed at minimizing unnecessary radiation exposure to the population from dental radiology. Current efforts in quality assurance and referral criteria are two aspects of NCHCT's own assessment of this technology which are described within the larger picture presented in this overview. The issues considered in this document go beyond the radiation exposure aspects of dental x-ray procedures. To be responsive to the informational needs of NCHCT, the assessment includes various other factors that influence the practice of dental radiology. It is hoped this analysis will serve as the basis for planning and conducting future programs to improve the practice of dental radiology.

24391 (PNL-SA—10964) **Hanford-worker health study: a status report.** Marks, S.; Tolley, H.D.; Gilbert, E.S.; Petersen, G.R. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 9p. (CONF-830220—1). NTIS, PC A02/MF A01. Order Number DE83007838.

From 31. annual meeting of the Radiation Research Society - epidemiology of irradiated human populations; San Antonio, TX, USA (27 Feb 1983).

Analysis of the workers' health at the Hanford plant produced no startling changes. Multiple myeloma is the only cancer type that shows a statistically significant trend of mortality with increasing radiation exposure. The study populations will be augmented by the addition of a group of construction workers in the future. Methodologic studies based on this data set are continuing.

24392 **Immunological detection of two types of cyclobutane pyrimidine dimers in DNA.** Ley, R.D. (Biology Division, Oak Ridge National Laboratory, Tennessee). *Cancer Research;* **43**: No. 1, 41-45(Jan 1983).

A hyperimmune rabbit antiserum to ultraviolet-irradiated DNA was observed to contain two activities directed against irradiated DNA. Radioimmunoassay studies demonstrated that both anti-

genic determinants were pyrimidine dimers as evidenced by the reduction in antibody binding to enzymatically photoreactivated irradiated DNA. Enzymatic photoreactivation specifically monomerizes pyrimidine dimers in DNA. Under conditions in which antiserum binding was measured with native DNA, binding was observed with DNA that contained both thymine-thymine and cytosine-containing dimers but not against native DNA that contained only thymine-thymine dimers. Under these assay conditions, competitive binding to irradiated DNA increased as a linear function of fluence of ultraviolet radiation. Under a second set of conditions in which binding was measured with single-stranded DNA, antibodies were bound to DNA which contained only thymine-thymine dimers. The fluence response for the increase in binding to thymine-thymine dimers was nonlinear and increased as a function of fluence squared. Binding to thymine dimers appeared to require bivalent attachment to two dimers that occurred in close proximity.

24393 **Lethality in repair-proficient Escherichia coli after 365nm ultraviolet light irradiation is dependent on fluence rate.** Peak, J.G.; Peak, M.J. (Argonne National Lab., IL (USA)). *Photochemistry and Photobiology;* **36**: No. 1, 103-105(Jul 1982).

Reciprocity (total applied fluence produces the same response, regardless of the fluence rate) for the lethal effects caused by 365 and 254 nm ultraviolet light (UV) was studied for repair-proficient and -deficient Escherichia coli strains. In the repair-proficient strain, E. coli WP2 uvr A^+ $recA^+$, reciprocity after 365 nm UV was only observed at fluence rates of about 750 Wm^{-2} and above. Below this rate, the cells became increasingly sensitive as the fluence rate was decreased. Similar lack of reciprocity was obtained whether the cells were exposed at 0 or 25°C. The double repair-defective mutant, E. coli WP100 uvr A recA, showed complete reciprocity after 365 nm UV over the same range of fluence rates measured for the repair-proficient strain. For 254 nm UV, complete reciprocity occurred in both strains over a range of fluence rates differing by an order of magnitude.

24394 **Effects of monomeric ^{239}Pu on the fetal rabbit.** Kelman, B.J.; Sikov, M.R.; Hackett, P.L. (Pacific Northwest Lab., Richland, WA (USA)). *Health Physics;* **43**: No. 1, 80-83(Jul 1982).

The effects of monomeric ^{239}Pu, on the pre-natal development of rabbits, was investigated. Pu239 was administered, intravenously, in doses up to 40μCi/Kg and it produced prenatal mortality, foetal growth retardation and diminished weight and skeletal ossification.

24395 **Carcinogenesis following prenatal exposure to radiation.** Sikov, M.R. (Pacific Northwest Lab., Richland, WA). *International Journal of Biological Research in Pregnancy;* **2**: No. 4, 159-167(1981). Contract AC06-76RL01830.

This review summarizes the literature dealing with postnatal development of tumors after prenatal exposure of laboratory animals to external radiation and to radionuclides. Many investigators have reported these exposures to be carcinogenic, some have not detected an effect, and still others observed decreased incidences of some tomor types. The resulting patterns of response suggest several pertinent biologic interactions that may be involved in the response elicited by prenatal irradiation.

24396 **(DOE-tr—22) Genetic effects of the decay of radionuclides in cells.** Gracheva, L.M.; Korolev, V.G. (USDOE, Washington, DC). 1980. Translation of Geneticheskie e'ffekty raspada radionuklidov v kletkakh, Atomizdat Publishers, Moscow, 1977. 150p. NTIS, PC A08/MF A01. Order Number DE83009411.

An attempt is made to present material on the genetic effects of radionuclide decay in cells in vivo. Special attention is focused on the genetic effects of the decay of radionuclides that can be incorporated in the cell DNA. Possible molecular mechanisms of lethal and mutagenic actions of such radionuclides are examined. The methods of preparation and the radiochemical properties of most of the radionuclides are given. On the basis of these properties their biological effect is also examined.

5602 Thermal Effects

24397 (ORNL—5927, pp 31-33) **Theoretical and applied cryobiology.** Mazur, P.; Cole, K.C.; Armitage, W.J.; Schneider, U. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The research of the Theoretical and Applied Cryobiology Group is devoted to low temperature biology, to the permeability and osmotic responses of cells, and to the effects of temperature and the state of the aqueous environment on the cell surface. The successful freezing of complex biological systems requires an understanding of the fundamentals of low temperature injury. However, an attractive feature of cryobiology is that a given experiment often yields information of both basic interest and practical utility. With this in mind, we are pursuing fundamental cryobiological studies, using for the most part cells that are themselves of practical interest in biology and medicine, namely, mouse and bovine embryos, mammalian erythrocytes, human granulocytes, and mouse skin.

24398 **(PB—83-147348) Habitat suitability index models: regression models based on harvest of cool and coldwater fishes in reservoirs.** Aggus, L.R.; Bivin, W.M. (Fish and Wildlife Service, Washington, DC (USA). Office of Biological Services). Sep 1982. 50p. NTIS, PC A03/MF A01.

This report presents methods designed to permit habitat classification of reservoirs that contain coolwater, coldwater, and seasonal two-story fisheries. Multiple regression equations describing relations between reservoir environmental characteristics and biomass harvest of selected sport fish species or groups are presented. Cumulative frequency plots of known harvest estimates from the various classes of reservoirs are presented to facilitate conversion of harvest predictions to Habitat Suitability Indices.

5603 Chemicals Metabolism And Toxicity

REFER ALSO TO CITATION(S) 23039, 23429, 24240, 24257, 24258, 24262, 24290, 24300, 24301, 24309, 24315, 24376, 24379, 24380

24399 **(AD-A—122525/9) Computer-assisted system for determination of O_2 consumption and CO_2 production in man. Final report.** Layton, R.P.; Flynn, E.T. (Naval Medical Research Inst., Bethesda, MD (USA)). Apr 1982. 43p. (NMRI—82-1). NTIS, PC A03/MF A01.

Determination of oxygen and carbon dioxide production rates are routinely made in the exercise physiology laboratory. A semi-automated, portable system based on a desktop computer has been developed. Expired gas from several breaths, collected in a bag, has its volume measured with a spirometer. The oxygen and carbon dioxide concentrations are directly read by the computer from the appropriate gas analyzers. The computations needed to evaluate oxygen consumption, carbon dioxide production and respiratory exchange ratio are automatically performed and the results immediately displayed. Measured volumes are accurate + or - 0.010 liters absolute and gas concentrations are reproducible to + or - 0.01% absolute. The system is technically simple and can be learned quickly by even relatively inexperienced operators.

24400 **(CONF-810488—7) Approach to modelling vegetation yield reduction from point-source emissions of sulfur dioxide.** Veselka, T.; Ballou, S.W.; Dauzvardis, P.A. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 8p. NTIS MF A01. Order Number DE83008627.

From International symposium on energy and ecological modelling; Louisville, KY, USA (20 Apr 1981).

Microfiche only, copy does not permit paper copy reproduction.

During the past decade, a great amount of research has been directed toward understanding the dose-response effects of gases emitted from industrial sources on vegetation. The results of this research, while still far from complete, can be translated into predictive models that will give estimates of damage to vegetation in terms of decreased yields and the amount of geographic areas ex-

posed. This paper presents one such model, developed at Argonne National Laboratory, which examines the possible SO_2-induced reduction in soybean yield located in the vicinity of a coal-fired power plant. Two hypothetical 1000-MW power plants located in Greensboro, NC were modeled using this technique, one with an emission rate of 1500 g/s and the other with a rate of 2250 g/s. Integrated SO_2 exposures were calculated to simulate reported dose-response data for soybeans. The results show that there was an insufficient dosage to cause detectable chronically induced yield reduction for the low emission case but a 7 to 8% reduction in yield was estimated for the high case. The total area which would experience a yield reduction of 5% or more was estimated to be about 1000 acres for the high-emission-rate case.

24401 **(CONF-810545—9) Improved method for predicting seasonal and annual shadowing from cooling-tower plumes.** Carhart, R.A.; Policastro, A.J.; Dunn, W.E. (Argonne National Lab., IL (USA); Illinois Univ., Urbana (USA)). 1981. Contract W-31-109-ENG-38. 14p. NTIS MF A01. Order Number DE83008522.

From 3. conference on waste heat management and utilization; Miami, FL, USA (12 May 1981).

Microfiche only, copy does not permit paper copy reproduction.

An improved model developed for predicting long-term shadowing due to cooling-tower plumes is presented, and its assumptions are compared with those used in previous models. The model is based on a method for the selection of representative categories of similar plumes developed by Policastro and Dunn to reduce the large number of meteorological data cases in a season or year at a site to a much smaller number, (about 100) of cases which yield distinctively different plume predictions. Plume predictions for the reduced set of category representative cases are then made with the validated plume model. Full effects of sun angle by time of day and day of the year for the latitude and longitude of the site studied are included. The model yields seasonal and annual isopleths of hours of additional shadowing or isopleths of percentage reduction in total and beam solar energy arriving at the ground on a horizontal surface. Results for two hypothetical sites with 2000-MWe generating capacity are presented, one near Syracuse, New York, and the other near Spokane, Washington.

24402 **(CONF-810631—8) Environmental and health aspects of waste-to-energy systems.** Farber, P.S.; Alexander, M. (Argonne National Lab., IL (USA); Alexander Associates, Ambler, PA (USA)). 1981. Contract W-31-109-ENG-38. 23p. NTIS, PC A02/MF A01. Order Number DE83007694.

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

Portions are illegible in microfiche products.

Municipal waste-to-energy systems are unique in their use of a pollutant (i.e., municipal solid waste) as fuel to produce usable energy. In eliminating one possible source of environmental and health problems, waste-to-energy systems can cause others to occur. Environmental and occupational-health impacts may occur in the handling, processing, or combustion of municipal wastes. A review is presented of the extent of the waste-to-energy market in the United States and the processes presently in commercial use or under development for converting municipal wastes to energy. Potential environmental-control and health-related problems are considered, and control techniques are discussed.

24403 **(CONF-820275—1) Ozone impacts on the productivity of selected crops.** Heck, W.W.; Cure, W.W.; Shriner, D.S.; Olson, R.J.; Heagle, A.S. (North Carolina State Univ., Raleigh (USA). Dept. of Botany; Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 41p. NTIS, PC A03/MF A01. Order Number DE83007514.

From Workshop on effects of air pollution on farm commodities; Washington, DC, USA (17 Feb 1982).

Portions are illegible in microfiche products.

The regional impacts of ozone on corn, wheat, soybean, and peanut crops are estimated by using dose-response functions to relate ambient maximum 7 h/d seasonal ozone concentrations to crop productivity data. Linear dose-response functions were developed from open-top field chamber studies. It was assumed that the limited number of cultivars and growing conditions available for the analysis were representative of major agricultural regions. Hourly ozone data were selected to represent rural concentrations and used to calculate maximum 7-h/d average values. Seasonal ozone averages for counties were extrapolated from approximately 300 monitoring sites. Results must be interpreted with knowledge of these assumptions and sources of uncertainty. Impacts are calculated for county units for the conterminous United States with maps showing patterns and tables summarizing the potential magnitude of ozone effects on selected crop yields. The assessment estimates that approximately three billion dollars of productivity could be gained if current maximum 7 hour per day ozone levels were reduced from present levels to below 25 parts per billion. Dollar values are based on 1978 crop prices, without accounting for price effects, to provide an overall estimate of the impact. Of the estimated economic impact, soybean represents 64%, corn 17%, wheat 12%, and peanuts 7%.

24404 **(CONF-820655—13) Radiation-dosimetry and chemical-toxicity considerations for ^{99}Tc.** Coffey, J.L.; Hayes, R.L.; Rafter, J.J.; Watson, E.E.; Carlton, J.E. (Oak Ridge Associated Universities, Inc., TN (USA)). 1982. Contract AC05-76OR00033. 22p. NTIS, PC A02/MF A01. Order Number DE83008710.

From Health Physics Society annual meeting; Las Vegas, NV, USA (27 Jun 1982).

Technetium-99 (T/sub 1/2/ = 2.13 x 10^5 y) is produced in the fission of ^{235}U and ^{239}Pu. Technitium-99 has been found to contaminate some areas of the uranium re-enrichment process. ICRP-30 Part 2 gives the Annual Limit on Intake (ALI) for ^{99}Tc as 2 x 10^8 Bq (5.4 mCi) for class D inhaled material (IC80). The ICRP states clearly that ALIs are based on radiation risk only and that chemical toxicity is not considered (IC79). No data wer found on the chemical toxicity of ^{99}Tc, possibly because there are no stable isotopes of technetium with which to study the toxicity, although, because of its long T/sub 1/2/, ^{99}Tc can, for all practical purposes, be considered stable. The ALI values for ^{99}Tc are based on data obtained using high specific activity /sup 99m/Tc (T/sub 1/2/ = 6 h) and /sup 95m/Tc (T/sub 1/2/ = 61 days). Since the specific activities of ^{99}Tc and $Na^{99}TcO_4$ are quite low (17 mCi/g and 9 mCi/g, respectively) and ^{99}Tc is available in abundant supply, we have attempted to assess the relative radiation and chemical hazards that are associated with this radionuclide. The approach in this study was (1) to study the effect of chemical dose on the whole body retention of ^{99}Tc sodium pertechnetate in rats and to relate these effects to the radiation dose and the ALI and (2) to compare the chemical toxicity of ^{99}Tc sodium pertechnetate with the ALI at different chemical dose levels.

24405 **(CONF-8103155—) 17. Lecture meeting on municipal composts and food quality.** (Deutsche Gesellschaft fuer Qualitaetsforschung (Pflanzliche Nahrungsmittel) e.V., Geisenheim (Germany, F.R.)). 1981. 104p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901012.

From 17. meeting on municipal composts and food quality; Speyer, F.R. Germany (26 Mar 1981).

Items within the scope of EDB have been entered individually into the data base. (ACR)

24406 **(CONF-8205169—1) Effect of NO_2 and SO_2 alone and in combination on the productivity of field-grown soybeans.** Irving, P.M.; Miller, J.E.; Xerikos, P.B. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83008643.

From US/Dutch international symposium on nitrogen oxides; Maastricht, Netherlands (24 May 1982).

Investigations of effects on plants from single pollutants are numerous and provide useful determinations of phytoxicity levels; however, pollutants rarely occur alone, and field investigations of pollutant combinations are limited. Combustion processes which generate sulfur dioxide (SO_2) usually produce a mixture of nitrogen oxides (NO/sub x/), as demonstrated by ambient air monitoring data. In order to determine the effects of pollutant combinations on crop plants, field investigations were conducted in 1980 and 1981

using soybeans (Glycine max L.) exposed to SO_2 and NO_2 alone and in combination, in the presence of ambient ozone (O_3). Open-air field plots of soybeans were fumigated with SO_2 and NO_2 through a system of aluminum pipes suspended above the plant canopy, utilizing the ZAPS (Zonal Air Pollution System) design. After being released from the pipe, the pollutant gas concentrations decreased with distance downwind from the pipe as a result of normal turbulent dispersion. In both years of the study, the soybean plots were fumigated on 10 occasions during the pod-filling period for an average exposure time during fumigation of 3 hours. Mean concentrations during fumigation periods ranged from 0.13 to 0.42 ppM of SO_2 and 0.06 to 0.40 ppM of NO_2. Results from both years of the experiment indicated that fumigations with NO_2 alone had no effect on seed yields. Exposures with SO_2 alone had no effect on yields in 1980 and decreased yields up to 6% in 1981. Combinations of SO_2 and NO_2 had a synergistic effect both years of the study and resulted in yield decreases ranging from 9 to 25%.

24407 **(DOE/ER/10731—2) Analysis of health effects resulting from population exposures to ambient particulate matter. Annual progress report, July 16, 1982-March 15, 1983.** Spengler, J.D. (Harvard Univ., Cambridge, MA (USA). Energy and Environmental Policy Center). 14 Mar 1983. Contract AC02-81EV10731. 64p. NTIS, PC A04/MF A01. Order Number DE83009189.

Portions are illegible in microfiche products.

The status and the progress (from July 16, 1982 through March 15, 1983) of the study on the health effects of airborne particles are described. Background information on the important research issues and objectives of the study is given, and the nature and purpose of the investigations undertaken in the second year of the study are summarized. The composition of the team performing the assessments and the technical activities performed by the research staff are presented. Finally, descriptions of various ongoing research projects and significant results that emerged from these assessments are provided.

24408 **(DOE/EV/02965—2) Mechanisms of mutagenesis: analysis through the use of alcohol dehydrogenase in Drosophila. Contract summary, May 1978-October 1980.** Sofer, W.H. (Johns Hopkins Univ., Baltimore, MD (USA). Dept. of Biology). [nd]. Contract AC02-76EV02965. 3p. NTIS, PC A02/MF A01. Order Number DE83008666.

The objective was to determine the mechanisms of mutagenesis of several mutagens in Drosophila melanogaster. The effects of mutagenesis on the amino acid sequence of alcohol dehydrogenase (ADH) and the nucleo-1 tide sequence of the ADH gene were studied. Mutations in this gene were generated and the modified nucleotide deduced from the amino acid change ungendered. (ACR)

24409 **(DOE/EV/10731—T1) Analysis of health effects resulting from population exposures to ambient particulate matter. Appendices to the annual progress report, July 16, 1982-March 15, 1983.** (Harvard Univ., Cambridge, MA (USA). Energy and Environmental Policy Center). 14 Mar 1983. Contract AC02-81EV10731. 163p. NTIS, PC A08/MF A01. Order Number DE83008538.

Portions are illegible in microfiche products.

Titles of the appendices are: evaluation of extrapolation errors under the constant relative potency model; bioassay analysis - data base considerations; solvent effects on the evaluation of mutagenic activity of airborne particulates; evaluation of the health effects of particles based on occupational data; bibliography of literature regarding the elemental character of ambient and source emission particles; a tabulation of source apportionment analyses in the literature; preliminary results for time-series analysis of daily mortality in New York; basic modeling applications using Harvard six-cities study male adult FEV measurements; further modeling applications using the Harvard six-cities study adult FEV data; development of pulmonary dose-retention models; and, simulation of inter-subject variabilities. (JGB)

24410 **(NP—3770036) Epidemiologic investigation of the mercury excretion in the urine of children living in an area of industrial concentration (Western Ruhr District).** Ohlig, P. (Muenchen Univ. (Germany, F.R.). Fachbereich Medizin). 12 Mar 1981. 74p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83770036.

Portions are illegible in microfiche products; Thesis.

The hazard area 0 is a larger industrial city, presenting a population density of 5000 inhabitants per km^2. The control area is a not industrialised residential district of 1500 inhabitants per km^2, with surroundings principally used for agricultural and forestry purposes. The examinations concerned those inhabitants born between 1910 and 1914, and those born between 1965 and 1969. The comparison of study 0 with the control study V led to the result that - under consideration of various influencing factors - in all investigations the children showed approximately identically high mercury levels. The comparative studies, differentiated according to urban districts, did not present a notably higher exposure neither of those children living in areas of high contaminant emission, nor of those children living next to contaminant issuers.

24411 **(NP—3770037) In vivo cytogenetic effect of some salts of the heavy metals cadmium, chromium, mercury, and platinum in assays of micronuclei and sister chromatid exchange.** Kaths, D.S. (Freiburg Univ. (Germany, F.R.). Forstwissenschaftliche Fakultaet). 1981. 80p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83770037.

Portions are illegible in microfiche products; Thesis.

After intraperitoneal (i.p.) administration of heavy metal salts, bone-marrow cells of the Chinese Hamster were examined on their cytogenetic effectiveness. Hycanthone was used as reference mutagen, which showed positive responses in both tests. According to the present cytogenetic and genetic results, potassium chromate, potassium dichromate, calcium chromate and cis-dichlordiamine platinum (II) belong to the class of mutagenic heavy metal salts. Cadmium acetate, cadmium sulphate, mercury chloride and calcium chromate led to negative results in the micronuclide test, whereas they showed positive results in the SCE test. In all cases the SCE test resulted to be more sensitive than the micronuclide test. Our findings and the available special literature show that genetically highly-active substances respond positively in preliminary and also in relevant tests. Less effective compounds, however, show differing results in the mutagenicity tests. When it was tried to draw conclusions from the mutagenic effect on the degree of carcinogenicity of the investigated substance, it was found that a positive result of the SCE test alone is not sufficient, but that the relevant aberration test has to be carried out additionally. In the heavy metal salts which were investigated until now, cytogenetic tests seem to permit a more reliable conclusion on revealed carcinogenic effects than the results obtained in tests with micro-organisms.

24412 (ORNL—5927, pp 19-21) **Enzyme and gene regulation in Drosophila.** Jacobson, K.B.; Owenby, R.K.; Christie, N.T.; Birchler, J.A.; Lee, E.H.; Flanagan, J.; Dorsett, D.; Wobbe, C.R.; Hearl, W. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

An economy that depends on fossil fuel and nuclear energy will inevitably be forced to deal with the by-products of its energy sources. The biological consequences of exposure of humans to substances that normally are encountered in trace amounts must be understood. In this research program two strategies are followed: (1) determine how the effects of certain mutations are neutralized by a natural mechanism; this is termed suppression and (2) seek the earliest events that occur when an animal is exposed to toxic metal ions and relate those to the physical-chemical properties of the metal ion.

24413 (ORNL—5927, pp 22-24) **Environmental insults to DNA.** Rahn, R.O.; Chang, S.S.; Sellin, H.G. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The purpose of this work is to investigate the mechanisms by which a variety of chemical and physical agents cause damage to DNA. In particular, the aim is to develop analytical methods for quantitating very low levels of DNA damage. Emphasis is placed on the use of nonradiometric assays to measure this damage. Such assays have particular importance in evaluating damage incurred by animals exposed to pollutants in the environment, i.e., under nonlaboratory conditions. In short, it is desired to use DNA damage as an indicator of exposure. The agents that have been studied include ultraviolet radiation, metal ions, and chemicals in coal tar mixtures such as benzo[a]pyrene. The mechanism by which the substitution of halogenated bases into DNA sensitizes cells to radiation has also been investigated. Major tools used in these investigations include fluorescence spectroscopy and HPLC. The fundamental approach used in these studies involves the application of basic knowledge of DNA physical chemistry to the solution of analytical problems facing the environmental biologists.

24414 (ORNL—5927, pp 24-25) **Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants.** Niyogi, S.K.; Feldman, R.P. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Certain metals have been identified as toxic agents, potential environmental carcinogens and mutagens through occupational exposure as well as in the laboratory. Increasing quantities and varieties of toxic metal compounds are being released as pollutants from mining, coal combustion, asbestos production, welding industries, etc. It is essential to understand the molecular mechanisms leading to metal toxicity in target tissues, in addition to screening for metal pollutants.

24415 (ORNL—5927, pp 42-50) **Comparative mutagenesis.** Epler, J.L.; Larimer, F.W.; Nix, C.E. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The feasibility of using short-term mutagenicity assays to isolate and identify the potential biohazard(s) of complex materials is being examined by use of various coupled chemical and chemical characterization and preparation for bioassay, followed by testing for bioactivity (generally the mutagenicity test for Salmonella histidine reversion described by Ames). Subsequent fractionation procedures to further characterize the mutagens present are carried out, with the bio-assay being used as a tool to follow the activity and guide the separations. The mutagenicity tests are intended to function as (i) predictors genesis; (ii) a mechanism to rapidly isolate and identify a hazardous biological agent in a complex mixture; and (iii) a measure of biological activity, correlating baseline data with changes in experimental (or environmental) conditions and, in the case of actual industrial effluents or streams, with changes in process conditions. With this combined chemical fractionation and short-term assay approach, information is being accumulated on the actual compounds responsible for the biological effect. Thus, the mutagenicity tests will also function as (iv) an aid in identifying the specific hazardous compounds involved and in establishing priorities for more definitive chemical analysis and monitoring along with further validative testing in comparative systems, including whole-animal testing, for mutagenesis and carcinogenesis.

24416 (ORNL—5927, pp 50-53) **Mammalian cell genetic toxicology.** Hsie, A.W.; Brimer, P.A.; DeMarini, D.M.; Machanoff, R.; Perdue, S.W.; Recio, L.; Schenley, R.L.; Stankowski, L.F.; Tindall, K.R. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The goal of this program is to study the mutagenic effects of energy-related chemicals and to estimate the risk to humans from exposure to these agents. Mammalian cells in vitro and in vivo have been used in this study, which has four main objectives. The Chinese hamster ovary cell/hypoxanthine guanine phosphoribosyl transferase (CHO/HGPRT) assay has been used to determine cytotoxicity and mutagenicity of environmental agents, to validate the assay for predicting carcinogenicity, and to study mechanisms of chemical mutagenesis. Our studies showed that this assay permits quantification of gene mutation and cytotoxicity induced by various promutagens and direct-acting mutagens. The Multiplex CHO assay has been used to enumerate sister chromatid exchange (SCE) and chromosome aberrations, and to study the interrelationships of chemically-induced cytotoxicity, gene mutation, SCE and chromosome aberrations. We have used recombinant DNA technology to study the molecular basis of mutation of E. coli xanthine-guanine phosphoribosyl transferase (gpt) gene (equivalent to mammalian hgprt in CHO cells) which has been transfected into HGPRT deficient CHO cells using the calcium-phosphate precipitation technique. Some gpt^+ CHO clones are stable following passage in nonselective medium and E. coli XGPRT activity can be demonstrated electrophoretically in extracts from these cells. We have continued development of (a) a quantitative human cell mutation (at the hgprt locus) assay, (b) a chromosomal deletion assay in a CHO/human hybrid cell line, and (c) a Chinese hamster in vivo system to assay for mutation at the hgprt locus, chromosome aberration and SCE in spleen cells. Use of these multiphasic genetic toxicity systems at the molecular, cellular, and animal levels should provide reliable identification of suspected environmental mutagens and be valuable in studying mechanisms of mammalian mutagenesis.

24417 (ORNL—5927, pp 61-66) **DNA repair in human cells.** Regan, J.D.; Carrier, W.L.; Kusano, I.; Furuno-Fukushi, I.; Dunn, W.C. Jr.; Francis, A.A.; Lee, W.H. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Our primary objective is to elucidate the molecular events in human cells when cellular macromolecules such as DNA are damaged by radiation or chemical agents. We study and characterize (i) the sequence of DNA repair events, (ii) the various modalities of repair, (iii) the genetic inhibition of repair due to mutation, (iv) the physiological inhibition of repair due to mutation, (v) the physiological inhibition of repair due to biochemical inhibitors, and (vi) the genetic basis of repair. Our ultimate goals are to (i) isolate and analyze the repair component of the mutagenic and/or carcinogenic event in human cells, and (ii) elucidate the magnitude and significance of this repair component as it impinges on the practical problems of human irradiation or exposure to actual or potential chemical mutagens and carcinogens. The significance of these studies lies in (i) the ubiquitousness of repair (most organisms, including man, have several complex repair systems), (ii) the belief that mutagenic and carcinogenic events may arise only from residual (nonrepaired) lesions or that error-prone repair systems may be the major induction mechanisms of the mutagenic or carcinogenic event, and (iii) the clear association of repair defects and highly carcinogenic disease states in man [xeroderma pigmentosum (XP)].

24418 (ORNL—5927, pp 69-72) **Genetic basis of mutagenesis and carcinogenesis.** Lalley, P.A.; Diaz, J.A. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The primary objectives of this project are (1) to investigate the genes important for susceptibility to mutagens and carcinogens whether they be physical, chemical or biological agents; (2) to identify, characterize and determine the chromosomal assignment of these genes; and (3) to investigate the linkage relationships of homologous genes in man, mouse and other species. The data derived from these studies are important since an elucidation of the genetic basis of these systems is essential for the ultimate understanding of how genetic and environmental factors interact in the process of mutagenesis and carcinogenesis. Comparative mapping data are important for the extrapolation of biological and biomedical data from laboratory animals to man. These studies are being pursued utilizing somatic cell hybrids as our experimental system, which allows for the genetic dissection of complex polygenic traits by isolating their component parts, and the determination of gene-chromosomal assignments due to preferential chromosome segregation. We have been investigating the genetics of the induction of the aryl hydrocarbon hydroxylase system (AHH) in the mouse, a system of major importance in chemical carcinogenesis. Restriction enzyme analysis has been utilized with cDNA probes specific for retrovirus genes to examine the chromosomal location of genes involved in murine

viral carcinogenesis. The other genes investigated and mapped can be grouped into genes which code for enzymes, hormones, androgen-inducible proteins and globin genes.

24419 (ORNL—5927, pp 84-87) **Frog Embryo Teratogenesis Assay: Xenopus (FETAX) - a newly developed screening assay for the detection of teratogens.** Dumont, J.N.; Schultz, T.W.; Newman, S.S.; Epler, R.G. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

There is no question that a rapid and inexpensive screening tool is needed to assess potential teratogenicity. The now classical Ames or Salmonella test and others screen for potential mutagenicity and carcinogenicity. Although a number of relatively rapid bioassays, using test organisms ranging from the invertebrates through lower vertebrates to mammals, as well as cell, organ and embryo culture systems, have been used to examine teratogenicity, none has been adequately validated or widely accepted for routine use. Thus our laboratory has sought to develop and validate a model screening assay for teratogens. Our model, referred to as FETAX (Frog Embryo Teratogenesis Assay: Xenopus) has to date been validated with 25 known mammalian teratogens of varying potencies and applied to examine the relative teratogenic risk of a variety of chemicals and complex mixtures from coal-conversion and shale oil technologies. Their effects have been compared to those of similar materials derived from natural petroleums.

24420 (ORNL—5927, pp 87-88) **Cytotoxicity of fossil fuel related pure compounds and complex mixtures.** Schultz, T.W.; Dumont, J.N. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The need for a time and cost effective means of screening or ranking the large number of industrial chemicals for their health effects has become the catalyst for recent renewed interest in quantitative structure activity relationships (QSAR) in ecotoxicology. QSAR permits the ranking of chemicals on the basis of meaningful correlations between their structure and their biological activity (e.g., toxicity). We have used a simple model system - the ciliate Tetrahymena pyriformis grown in axenic culture - to investigate QSAR among a variety of classes of pure chemicals known to be present in complex mixtures pf materials obtained from several synfuel industries. In addition, we have tested a number of the complex mixtures themselves. The endpoint of our assay reflects the ability of the test compound to impair growth (i.e., reproduction) of the culture. Using a large group of nitrogen heterocyclic compounds and a large group of napthalenes and their derivatives, the following relationships have been demonstrated. For dinitrogen compounds, increases in toxicity follow increases in methyl substitution, the number of aromatic rings, molecular weight, boiling point, number of carbon atoms and log of the partitioning coefficient (hydrophobicity). For the naphthalene compounds, their ability to accept or donate hydrogen and their hydropholic substituent constant have high correlations with toxicity. For complex mixtures, toxicity appears to be related to aromaticity and heteroatom substitution. The finding that hydrotreatment, which reduces both parameters, mitigates the toxic response supports this observation.

24421 (ORNL—5927, pp 96) **Dose-response curve for ethylnitrosourea-induced specific-locus mutations in mouse spermatogonia.** Russell, W.L.; Hunsicker, P.R.; Raymer, G.D.; Steele, M.H.; Stelzner, K.F.; Thompson, H.M. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The results from ethylnitrosourea (ENU) have provided the most extensive dose-response curve yet obtained for induction of specific-locus mutations in mouse stem-cell spermatogonia by any chemical. Seven doses, ranging from 25 to 250 mg/kg of body weight were tested, and after allowing for clustering, at least 120 independent mutations were scored in a total of 59,483 offspring. In the lower portion of the curve, below a dose of 100 mg/kg, the data fall statistically significantly below a maximum-likelihood fit to a straight line. Independent evidence, described in the next section, indicates that, over this dose range, ENU reaches the testis in amounts directly proportional to the injected dose. It is concluded that the spermatogonia are capable of repairing at least a part of the mutational damage when the repair process is not swamped by a high dose.

24422 (ORNL—5927, pp 97-98) **Effect of dose fractionation on the ethylnitrosourea induction of specific-locus mutations in mouse spermatogonia and its bearing on risk estimation.** Russell, W.L.; Hunsicker, P.R.; Carpenter, D.A.; Cornett, C.V.; Guinn, G.M. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The specific-locus mutation frequency from a single dose of 100 mg/kg of ENU was compared with that from a total dose of 100 mg/kg fractionated into doses of 10 mg/kg injected at weekly intervals. The induced mutation frequency with the fractionated dose was only 13% of that with the single exposure, and the difference was statistically highly significant ($P < 1 \times 10^{-8}$). Carricarte and Sega of this Section have measured the amount of unscheduled DNA synthesis occurring in mouse spermatids after intraperitoneal injection of ENU. Over the range from 100 to at least 10 mg/kg, and possibly lower, unscheduled DNA synthesis is directly proportional to the amount of ENU injected. In an additional study, Sega has shown that DNA ethylation in the testis after intraperitoneal injection of tritium-labeled ENU is directly proportional to injected dose over the range of 10 to 100 mg/kg. These findings demonstrate that the decrease in mutation rate below linearity in this range of doses and the reduced mutagenic effect when the 100 mg/kg dose is fractionated, are not due to failure of the chemical to reach the testis in proportionate amounts. The obvious conclusion is that, at a dose of 10 mg/kg, the spermatogonia have the capacity to repair a major part of the genetic damage induced by ENU. This demonstration of an effective repair mechanism in spermatogonia suggests that the genetic risk to humans from some chemicals that have been proved to be mutagenic in lower organisms, or even in mammalian somatic cells, may be considerably less than previously predicted. It remains to be tested whether repair of ENU-induced damage might be even more effective at still lower doses. The possibility of a threshold dose is not excluded, although it should be kept in mind that this apparently does not occur with radiation-induced mutations in spermatogonia.

24423 (ORNL—5927, pp 98) **Effect of sex and cell stage on induction of mutations by ethylnitrosourea in the mouse.** Russell, W.L.; Hunsicker, P.R.; Phipps, E.L. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

For the estimation of genetic risk it is important to know the relative mutational sensitivities of the various germ-cell stages. The data now available for ENU show that, at doses of 100 mg/kg and above, postspermatogonial stages and mature and maturing oocytes are giving mutation rates approximately one order of magnitude lower than those obtained from spermatogonia. It should be noted, however, that even with the dose as low as 100 mg/kg to males, no offspring were recovered from matings made during the sixth and seventh weeks post-injection. So, for cells that were treated as differentiating spermatogonia or early spermatocytes, the mutational sensitivity to ENU is still not known. From exposure of arrested oocytes, scored in conceptions occurring more than six weeks after injection, only one mutation has been observed in over 10,000 offspring, a figure not significantly different from the control. Thus, so far, it appears that the major genetic hazard from ENU would lie in exposure of the stem-cell spermatogonia.

24424 (ORNL—5927, pp 99) **Nature of specific-locus mutations induced by ethylnitrosourea in mouse spermatogonia.** Russell, W.L.; Hunsicker, P.R.; Bangham, J.W.; Maddux, S.C. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The frequency distribution among the seven loci of the mutations obtained from ENU in spermatogonia is strikingly similar to

that observed for X and gamma irradiation of spermatogonia, with one exception. With the chemical or with irradiation, the mutation rate is relatively low at the a and se loci, intermediate at the c locus and high at the b, d and p loci. With radiation, however, the frequency is highest of all at the s locus, whereas with ENU the frequency at s is low. In view of the evidence presented below that the ENU-induced mutations may be primarily gene mutations, the general correspondence of the distribution among the loci with that for irradiation of spermatogonia provides some support for the view that the radiation-induced mutations may also be primarily gene mutations. This argument is based on the observation that when deficiencies are known to constitute a larger proportion of the mutations scored, as is the case with X irradiation of postspermatogonial stages or neutron irradiation of spermatogonia, then the distribution among the loci is noticeably changed. More than 25% of the mutations induced in spermatogonia by ENU have a phenotypic expression intermediate between that of the viable null allele and wild-type. This indicates this proportion of the mutations are probably intragenic changes. That the proportion could be much higher is supported by the following two facts. First, there have been no occurrences of d-se deficiency, a type of event that is not uncommon when the conditions of a radiation experiment are known to result in deletions. Second, at five of the seven loci the proportion of mutations that are lethal in homozygous condition is very low, less than 5%. From the above results, it is clear that there is no validity to the earlier speculation by others that our specific-locus method might be detecting only deficiencies and not gene mutations.

24425 (ORNL—5927, pp 100) **Methylnitrosourea-induced specific-locus mutations in the mouse.** Russell, W.L.; Hunsicker, P.R.; Carpenter, D.A. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Methylnitrosourea (MNU) is much more toxic than ENU. Because MNU is a powerful mutagen in other biological systems, including Drosophila, and in some cases is much more potent than ENU, it was surprising to find that it has little or no mutagenic effect in mouse spermatogonial stem cells. Following injections of 70, 75, or 80 mg/kg (weighted mean dose 74 mg/kg), only three mutations have been obtained, to date, in 21,079 offspring from cells treated in spermatogonial stem-cell stages. This is only slightly, and not significantly, above the control mutation frequency. A comparable dose of ENU would have given about 41 mutations in an equivalent number of offspring. From dominant-lethal studies by Generoso, the results of Sega et al. on unscheduled DNA synthesis and on molecular dosimetry, and from the data presented in the next paragraph, it is abundantly clear that MNU reaches the germ cells in the testis in active form. Testing MNU for its mutagenic effect in post-stem-cell stages produced another surprising result. With a dose of 75 mg/kg to the male parents, the offspring conceived within the first five weeks after injection showed only a low mutation rate. However, offspring conceived in the following week had an exceptionally high mutation frequency that was totally unexpected. In 2,827 offspring, 18 mutations have been scored. This, with a dose of only 75 mg/kg, is similar to the mutation frequency obtained with 250 mg/kg of ENU in spermatogonia. Offspring conceived in the sixth week after injection probably came from cells exposed as differentiating spermatogonia or preleptotene spermatocytes. As was pointed out earlier, the mutagenic effect of ENU on these particular stages is not yet known. Regardless of that outcome, it is apparent, from the low mutagenic response of stem-cell spermatogonia to MNU, that results with ENU were not predictive of what would happen with MNU.

24426 (ORNL—5927, pp 102-103) **Mouse Spot Test: evaluation of its performance as a prescreen.** Russell, L.B.; Guinn, G.M.; Montgomery, C.S. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The Mouse Spot Test (MST) is an in vivo mammalian assay that can detect a considerable array of genetic events affecting a set of marked loci. It thus provides indicators of genotoxicity germane to predictions of human health hazards that arise from either heritable or somatic mutations. Although some common loci are used in the MST and the specific-locus test (SLT), the array of scorable genetic events is broader in the MST. To determine the degree of success with which the MST, a somatic test, predicts the induction of heritable damage, quantitative comparisons were made between the MST and the SLT by calculating unit mutation rates (rates per locus per mole of exposure). In 26 of 27 comparisons, the unit rate for the MST was higher than that for the SLT. When both tests had yielded clearly positive results, the MST/SLT ratio was of the order of 1 to 10 (usually 1 to 5). Future MST results can thus be used with some confidence to make broad quantitative predictions about upper limits for SLT frequencies. Priority for initiating SLTs should be low when the MST is clearly negative, and should be high when the MST unit mutation rate is high. There are several possible reasons (e.g., special repair capabilities in germ cells) why an SLT might occasionally be negative when the MST is positive. In these and other cases, the SLT provides the more pertinent data for assessment of risk from heritable point mutations, the MST being merely the prescreen. The MST has ancillary capabilities for directly detecting embryotoxicity, teratogenicity, and cytotoxicity. The occurrence and magnitude of such effects show no clear correlation with mutagenic potency. In limited comparisons between MST results and those from carcinogenicity bioassays, the MST sensitivity was 81.3%, but no negative carcinogens have as yet been tested in the MST.

24427 (ORNL—5927, pp 103-104) **Investigation of the supermutagen ENU and other substances in the Mouse Spot Test.** Russell, L.B.; Montgomery, C.S. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Because ethylnitrosourea (ENU) was found to be the most efficient mutagen yet encountered in mouse spermatogonial stem cells, we investigated its ability to induce somatic mutations in the Mouse Spot Test (MST). ENU was also compared with methylnitrosourea (MNU) and ethylnitrosourethane (NEC). We found that ENU readily induces recessive spots (RS) and, due to its low toxicity, can be applied at relatively high doses. The ENU mutation frequency in cells at risk, calculated per locus, per unit of applied dose, is roughly similar for melanocyte precursors (in the spot test) and spermatogonial stem cells (in the specific-locus test). MNU is clearly mutagenic, and dose extrapolations indicate it to be more potent than ENU. NEC is only weakly mutagenic. The spot test also yields information on cytotoxicity (white midventral spots), embryotoxicity, and teratogenicity. The toxicity and teratogenicity findings parallel earlier results in the rat. For all endpoints studied, ENU is more effective than NEC. Relative to MNU, ENU is less toxic, less teratogenic, and less mutagenic in the spot test; but it is much more carcinogenic (transplacentally) and more mutagenic in spermatogonial stem cells. We propose that MNU is more effective in inducing gross chromosomal damage than is ENU, while ENU induces relatively more gene mutations. The MST was also used to test Triclosan, a chlorophenoxyphenol. The frequency of presumed somatic mutations was not significantly greater in the experimental groups than in the methanol-injected controls. We also carried out or completed tests of various coal-technology-related substances by means of the MST, specifically Coal Liquid No. 2 (SRC process) and ESP Tar No. 83 (UMD low-Btu gasifier). Both were negative for mutational effects.

24428 (ORNL—5927, pp 107-108) **Ethylnitrosourea is also a supermutagen for dominant skeletal mutations.** Selby, P.B.; Lee, S.S.; Raymer, G.D.; McKinley, T.W. Jr. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The non-breeding-test methods have been used to study induction of dominant skeletal mutations by ethylnitrosourea, a supermutagen for inducing specific-locus mutations. Mutation induction was studied in spermatogonial stem cells for two exposure levels, 150 mg/kg and 250 mg/kg (i.p. injections). Because of a severe effect of ENU on fertility, only 8 offspring were collected at the higher exposure. The presumed mutation frequencies in the 150 mg/kg and 250 mg/kg experiments were 7/331 (2.1%) and 0/8, respectively. The first frequency is statistically significantly higher

than the control frequency of 5/1599 (0.3%). Indices of mutation and the adjusted proportions of index anomalies (shown in parentheses) were 6.1% (30/331) and 35% (3/8). In both cases, the indices are statistically significantly above 0. In fact, the index at 250 mg/kg is statistically significantly higher than that obtained in any other experiment to date, and the index at 150 mg/kg is statistically significantly higher than that in any non-ENU experiment, with the sole exception of the 100 R + 500 R x-ray experiment. These ENU experiments provided the first demonstration that ENU induces serious dominant disorders. Results to date suggest that a smaller fraction (roughly one-half as many) of the mutations induced by ENU may be deleterious than of those induced by low-LET ionizing radiation. This is important to pursue, because the commonly used doubling-dose approach for estimating genetic hazard assumes that an equal fraction of spontaneous and induced mutations is deleterious, regardless of the mutagen. If the fraction of induced mutations that is serious is found to be strongly dependent on the mutagen, methods for estimating genetic risk will have to rely on measures of dominant damage even more heavily than is thought at present.

24429 (ORNL—5927, pp 108-109) **Tests of dichlorvos to see if it induces dominant skeletal mutations.** Selby, P.B.; McKinley, T.W. Jr.; Raymer, G.D. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Dichlorvos is a widely used chemical that has been shown to be a mutagen in a few short-term tests. In early 1980 we used dichlorvos to eradicate mites from the stocks of mice used in skeletal experiments. Before using dichlorvos routinely, it was essential to determine whether this chemical induces enough mutations to interfere with our experiments. In this application of the non-breeding test methods, both C3HF-strain females and 101-strain males were exposed continuously for 80 days to one-third of a resin strip impregnated with dichlorvos placed on top of each cage. The total exposure was at least 20 times higher than that which is sufficient to exterminate all mites. A concurrent control was also set up. Animals in the exposed group were pair mated immediately after treatment, with the result that offspring in the sample were derived from germ cells exposed chronically at many different stages of development in both sexes. The corrected probable mutation frequency in the concurrent control is 1/505, and in the group with both parents treated it is 0/491. From these data, we can rule out an induced presumed mutation frequency of 0.33% at the 5% significance level. Because dichlorvos does not affect fertility, we can assume that it is conservative to extrapolate linearly from the frequency ruled out to the maximum frequency expected for one-twentieth of the exposure. Accordingly, the maximum induced presumed-mutation frequency from a treatment to eradicate mites is 0.016%, which is only a small fraction of the historical control frequency of 0.29%. Such a low frequency would not be expected to interfere with skeletal experiments.

24430 (ORNL—5927, pp 113) **Use of the mouse heritable translocation test in testing chemicals.** Generoso, W.M.; Cain, K.T.; Bandy, J.A.; Cornett, C.V. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982 .

Certain spermatogenic cell stages of the mammal are known for their high sensitivity to chromosome breakage effects of certain chemical mutagens. Consequently, this type of genetic damage is of serious concern in the evaluation of genetic hazards posed by chemicals in the environment. From this standpoint, the heritable translocation test (HTT) in mice is generally regarded as an important method both for detecting chromosome breakage effects and for assessing genetic risk to humans. We are currently working on the improvement of the HTT for use in practical testing. At the same time we apply this method in testing specific compounds that are suspected of being genetically hazardous to exposed humans. In the past two years, we have completed a study of three GRAS compounds - ammoniated glycerrhizin, butylated hydroxytoluene, and gum arabic. None of these compounds appears to be effective in inducing heritable translocations in male mice. We found earlier that the compound ethylene oxide, when injected into male mice, is highly efficient in inducing dominant-lethal mutations and heritable translocations. Ethylene oxide is the first industrially important compound that has been shown to induce heritable translocations in mice. Because of this, and because of the fact that production and use of this compound involve wide-scale human exposure, ethylene oxide is a good model compound for studying the usefulness of the heritable translocation test in genetic risk assessment. Accordingly, we are currently performing a dose-response study with inhaled ethylene oxide, including the current US maximum allowable workplace concentration of 50 ppM.

24431 (ORNL—5927, pp 114) **Role of whole-mammal mutagenicity tests in predicting genetic risk.** Russell, L.B.; Selby, P.B. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982 .

There is presently much official concern, both in this country and others, about the extent to which mutagenicity tests in non-mammalian, or in mammalian in vitro systems can predict the transmission of heritable damage in a mammal. Several national and international bodies are at work in attempts to define the signals that should lead one to perform genetic tests in mammals, to sort out the type of information that can be derived only from whole-mammal tests (e.g., differential germ-cell stage responses), and to examine the sensitivities and special capabilities of the various mammalian test systems. We have been involved in the efforts of the following deliberating bodies: International Commission for Protection Against Environmental Mutagens and Carcinogens, GENE-TOX (test panels and coordinating committee), and the International Agency for Research on Cancer.

24432 (ORNL—5927, pp 114-115) **Chemical dosimetry studies in mammalian germ cells.** Sega, G.A.; Owens, J.G. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982 .

Studies on developing mouse sperm have shown that both DNA and protamines are important molecular targets for chemical attack that may lead to chromosome aberrations. Our recent studies have shown that the sulfur group in cysteine is the predominant site of alkylation in the mouse protamines. Another important observation is that not all chemical mutagens have a strong affinity for mammalian protamines. Chemicals that react by an S/sub N/2-type mechanism interact much more strongly with mammalian protamines than do chemicals reacting by an S/sub N/1-type mechanism. There are also differences in the patterns of genetic response of the developing germ cells to these two classes of chemical agents. Recently, W.L. Russell showed that a single 100 mg/kg exposure to ethylnitrosourea (ENU) produced an 8 x higher mutation frequency in spermatogonial stem cells of mice than did 10 weekly exposures of 10 mg/kg. Using tritium-labeled ENU and subsequently analyzing DNA recovered from mouse testis, we have obtained preliminary evidence that the ratio of O^6-ethylguanine (O^6-EG) to N^7-ethylguanine (N^7-EG) is greater after a single 100 mg/kg exposure to ENU than after a 10 mg/kg exposure. Also, the O^6-EG appears to persist longer in testis DNA after the high ENU exposure than after the low exposure. Ethylation of the O^6-position of guanine has been implicated as a potentially mutagenic (and carcinogenic) event. It is thus possible that the higher mutation frequency found after the single 100 mg/kg ENU exposure resulted from the production of relatively more O^6-EG and the persistence of this adduct in the germ-cell DNA over a longer time period. Such data have important implications for genetic testing in the mammal, where high exposure levels of a chemical agent may be altering the proportions of DNA alkylation products in the germ cells and possibly inhibiting the repair systems.

24433 (ORNL—5927, pp 115-117) **DNA repair studies in mammalian germ cells.** Sega, G.A.; Owens, J.G.; Carricarte, V.C. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982 .

We have established that unscheduled DNA synthesis (UDS), assumed to be DNA repair, occurs in meiotic and in some

postmeiotic germ-cell stages of male mice exposed to a number of mutagenic agents. To measure this UDS, males are treated with a test chemical and are also given testicular injections of [^{3}H]dThd. Sperm moving through the reproductive tract are recovered at various times after treatment and assayed for the unscheduled presence of [^{3}H]dThd. A number of chemical agents have now been tested by us for their ability to induce a UDS response in mouse germ cells. We have observed an excellent correlation between a chemical's ability to induce a UDS response in the germ cells and its ability to produce mutations in the Russell specific-locus test. Of the chemicals producing a positive UDS response in the germ cells, only hycanthone methanesulfonate (weakly positive for inducing UDS) was negative in the specific-locus test. All chemicals giving a negative UDS response were also negative in the specific-locus test. From the data currently available, it appears that a chemical's ability to induce a UDS response in mouse germ cells can serve as a good predictor of the agent's potential for being mutagenic. Since a test of the UDS response of mouse germ cells to a chemical agent is relatively fast and inexpensive to perform, it may be a useful prescreen before large amounts of time and money are invested on a genetic testing. Recently, we have studied the ability of ethylnitrosourea (ENU) to induce a UDS response in mouse germ cells. The results of this study are discussed.

24434 (ORNL—5927, pp 117-118) **DNA damage in mammalian sperm assayed by alkaline elution.** Sega, G.A.; Owens, J.G. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982 .

One of the important uses of the alkaline elution technique is to assay for single-strand breaks in DNA. A modified alkaline elution technique has been devised by us for monitoring the presence of DNA single-strand breaks in sperm recovered from mutagen-treated mice. In the procedure, sperm are recovered at various times after mutagen exposure and lysed on a filter and singled stranded DNA is eluted through the filter with a high pH buffer. Small fragments of DNA resulting from single-strand breaks pass more readily through the filter than do the high-molecular-weight DNAs in which no breaks have been produced. The amount of sperm DNA passing through the filter is then used as a measure of the amount of single-strand breakage induced. Using methyl methanesulfonate (MMS) as a test mutagen we have been able to demonstrate that DNA strand breaks are produced in the developing sperm after a single exposure to this chemical. The strand breakage was found to be greatest in sperm treated as mid- to late-spermatids, which are also the stages showing the highest frequencies of dominant lethals and translocations after MMS exposure. When sperm representing earlier germ-cell stages at the time of treatment were studied (longer exposure-to-sampling intervals), the amount of DNA strand breakage decreased. By 21 days after MMS exposure, DNA breakage was barely detectable. We know from our studies of unscheduled DNA synthesis (UDS) in mouse germ cells that these earlier stages undergo a DNA repair response to MMS. Presumably, many of the MMS-induced lesions in the DNA that would give rise to single-strand breaks are repaired before these early germ cell stages have reached the vas as mature spermatozoa.

24435 (ORNL—5927, pp 118-119) **Inhalation mutagenesis of ethylene oxide: unscheduled DNA synthesis and dominant lethal effects.** Cumming, R.B.; Lewis, L.R. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Ethylene oxide (EtO) is a mutagen of considerable current interest to federal regulatory agencies because of wide-spread occupational exposures. We have studied unscheduled DNA synthesis (UDS) induced in spermatids of EtO-exposed males, as well as dominant-lethal (DL) mutations transmitted by such males. Both the UPS and the DL studies show that the effects we can measure depend on high exposure to EtO is a matter of some concern, but that quantitative estimation of human genetic effects will be complex.

24436 (ORNL—5927, pp 119-120) **Molecular dosimetry of ethylene oxide in the mouse.** Cumming, R.B.; Sega, G.A.; Lewis, L.R. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Ethylene oxide (EtO) is an important industrial chemical to which there is significant human exposure. Not only is there the possibility of industrial and accidental human exposure, but also, because the compound is widely used as a fumigant and sterilant, humans commonly encounter residues from such uses. EtO is mutagenic in many test systems and has recently been shown to be carcinogenic in rats and probably in man. The current threshold limit value for exposure to humans is a concentration of 50 ppM as a time-weighted average for an 8-h work day. This is commonly acknowledged to be too high, and there are proposals to lower the limits for human exposure. The rational regulation of exposure limits for EtO requires a quantitative risk assessment for the various health effects known or suspected for this agent. An important component of any such assessment is the measurement of the tissue dose for EtO under various conditions of exposure. The molecular dosimetry project is designed to provide this quantitative information which will become an important part of any risk assessment for human health consequences from the use of this compound. In these experiments, we have looked at alkylation of hemoglobin, testicular DNA, liver DNA, lung DNA, spleen DNA, kidney DNA, sperm cells from the vasa defferentia and the caudal epididymides, DNA from these sperm cells, and protamine from these sperm cells. We have examined these tissues from animals sacrificed from 10 min to 15 days after the end of exposure. The fact that alkylations per nucleotide in germ-cell DNA can be readily measured and appear to show an at least roughly linear relationship to exposure in the 1 to 3 ppM.h range is an interesting finding. Human exposure limits are currently 400 ppM.h per day.

24437 (ORNL—5927, pp 120-121) **Semidynamic inhalation exposure system.** Cumming, R.B. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

In a major study of the Molecular Dosimetry of Ethylene Oxide in the Mouse (see the previous report), it became apparent that existing inhalation exposure systems were not suited for certain problems encountered in inhalation molecular dosimetry. Inhalation chambers have classically been of two types - static and dynamic. Neither has the properties necessary for precise exposure for prolonged periods to materials which must be conserved (such as isotopically labeled compounds). In an attempt to solve this problem we have developed a semi-dynamic inhalation system which allows precise control of the exposure conditions while using the test agent very economically. In this system, the atmosphere is pumped through a circular path, where the unwanted materials (e.g. CO_2, moisture) are removed and the concentration of the test agent is continuously monitored. Oxygen is supplied at the rate at which it is consumed, and since this rate can be measured, this procedure provides a rough measurement of the metabolic rate of the animals in the chamber. The test agent is supplied at the same rate at which it is consumed, thus keeping concentrations constant for whatever time period desired. The apparatus consists of a chamber, a pump to create the flow of the atmosphere through the system, a series of traps to remove moisture and CO_2 while leaving the test agent in the stream, a Wilks Miran I infrared spectrometer with a 20 m path-length cell, a monometer to measure chamber barometric pressure, an oxygen supply system, and a syringe pump to supply the test agent at the rate at which it is consumed.

24438 (ORNL—5927, pp 121-122) **Dose response modeling for chemical mutagens.** Cumming, R.B.; Olson, W.H. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Extrapolation of animal test data for the purpose of estimating human genetic risk requires that one compare relatively high exposures given to the animals with much lower exposures expected to occur in human populations. One way of providing informa-

tion that is useful in these extrapolations is to use molecular dosimetry in a suitable intact mammal. Even with this approach, modeling is necessary, and this modeling must be supported with appropriate logical and mathematical arguments. In attempting to develop such modeling, we have been particularly interested in defining conditions under which one would expect linear relationships, and others under which such linear relationships would be expected to break down. We have defined Haber's Rule as it can be applied to the relationship between the integral of concentration and time for exposure to tissue (target) dose for chemical mutagens. Haber's Rule is defined to the relationship between the integral of concentration and time for exposure to tissue (target) dose for chemical mutagens. Haber's Rule is defined in the context of compartmental models based on mammalian anatomy and physiology. It is then proved that Haber's Rule holds for any system of linear differential equations with constant coefficients which is physically realizable. We have also studied non-linearities and the Blum-Drukrey model for time-to-occurrence of tumors. We expect on theoretical grounds that linear relationships will hold at low concentrations of toxic agents, where most human exposures will occur, and that non-linearities will dominate at higher exposures, where most animal experiments are conducted.

24439 (ORNL—5927, pp 123-125) **Mutagenicity of nonvolatile organics in undisinfected and disinfected wastewater effluents.** Cumming, R.B.; Lewis, L.R. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

For the past several years we have been investigating the potential for adverse human health effects caused by toxic chemical species formed and released to the environment in the process of disinfecting wastewaters. It has been known that the most widely used disinfection procedure, chlorination, in the presence of suitable precursors can produce modified organics which have biological activity. It is now clear that the most likely chemical treatment alternative to chlorine, ozone, can similarly, produce such organics in aqueous solutions. What is still not clear is the overall health impact of the disinfection technologies as they are now practiced or are likely to develop in the future. We have investigated the mutagenicity of nonvolatile organics from nine wastewater treatment plants in five states. The effluents were tested without disinfection and following disinfection technologies as they are now practiced or are likely to develop in the future. We have investigated the mutagenicity of nonvolatile organics from nine wastewater treatment plants in five states. The effluents were tested without disinfection and following disinfection with chlorine, ozone or uv irradiation. It appears that at the early stages of treatment of these wastewaters with oxidating disinfectants, such as chlorine or ozone, new compounds are formed, some of which may be mutagenic. As the contact times or concentration of oxidant increase, mutagens and other organic compounds are destroyed. The net results, which are measured by chemical analysis and toxicological tests, are dependent on the precise conditions at the time the sample is collected. These studies illustrate that the bacterial tests, when facing very complex environmental mixtures, give only rough qualitative information.

24440 (ORNL—5927, pp 134) **Effect of ethylnitrosourea, methylnitrosourea, and hydroxyethylnitrosourea on the testis.** Oakberg, E.F.; Crosthwait, C.D. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Cell killing and cell-cycle kinetics of spermatogonial stem cells are being studied to provide the basis for interpretation of genetic and fertility effects of radiation and chemicals. A comparative study of the effects of ethylnitrosourea (ENU), methylnitrosourea (MNU) and hydroxyethylnitrosourea (HENU) revealed a similar pattern of spermatogonial killing for all three compounds. On the other hand, W.L. Russell has shown that these three compounds have very different mutagenic effectiveness in spermatogonial stem cells: ENU is considerably more mutagenic than the other chemicals. Cells exposed in leptotene to 100 mg/kg and higher doses of ENU were found to degenerate in pachytene 5 days later. It is not known whether this delay in response results from a delayed expression of damage induced at the time of treatment, or from the persistence of ethylations which become effective at a critical stage of cell development. The lack of parallelism between cell-killing and mutational responses of spermatogonia to ENU, MNU, and HENU, together with the selective action of ENU on the leptotene stage of primary spermatocytes, demonstrates the high specificity of the cellular response to this chemical. Further, as noted, the cell death response to ENU exposure is delayed. Labeling with tritiated thymidine prior to exposure to ENU indicates that there is no significant difference between cells in S and those in other stages of the cell cycle in sensitivity to cell killing. This suggests that, with ENU, one is unlikely to find cell synchronization, resulting from the killing of sensitive stages of the cell cycle, as one does with radiation. The effect of dose fractionation on mutation frequency should be less marked for ENU than it is for radiation.

24441 (ORNL—5927, pp 135-136) **Teratogenic mechanisms and prescreening system.** Filler, R.S.; Horton, Y. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

Embryonic development is the most sensitive phase of the mammalian life span. Therefore, teratological considerations may provide the limiting factor in setting tolerance limits for environmental pollutants. Because compounds produced in energy-related technologies have as yet largely unknown teratogenic potential, our aims are to establish a sensitive and rapid prescreen for identifying putative teratogens and to elucidate operative mechanisms involved in teratogenesis. Embryonal carcinoma (EC) cells, obtained from aryl hydrocarbon hydroxylase responsive and nonresponsive mice, have developmental capabilities analogous to early-stage embryos. EC cells can bioactivate proteratogens to various reactive intermediates via the 3-methylchol-anthrene-type mixed-function oxidase system, but not by the phenobarbital-type pathway. A positive correlation has been established between the developmental potential of EC cells and (1) the extent of biotransformation of proteratogens, (2) chemically-induced cytotoxicity and (3) restriction in vivo teratogenic prescreen. In parallel to the EC experiments, murine preimplantation embryos have been assayed to determine if an endogenous embryonic MFO system is operative. The developmental onset of biotransformation activity coincided with blastocyst formation (gestational day 3 1/2). In addition to demonstrating a basal MFO activity, blastocysts were also responsive to enzymatic induction with the 3-MC-type inducer TCDD but not with PB-type inducers. As had been the case with EC cells, deactivation pathways were also present but did not involve glucuronide or sulfate ester formation.

24442 (ORNL—5927, pp 139-143) **Systemic toxicology.** Witschi, H.R.; Haschek, W.M.; Smith, L.H.; Morse, C.C.; Sigler, C.A.; Martin, F.; Brattsten, L.B.; Paton, C.L.; Owenby, C.S.; Harden, M.J. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

It has been shown that diffuse alveolar damage produced by the antioxidant butylated hydroxytoluene (BHT) can be aggravated by oxygen. The resulting lung lesion resembles adult respiratory distress syndrome (ARDS). We established that diffuse interstitial fibrosis not only results from an interaction between BHT and oxygen but that the same result can be obtained by using several different compounds. In mice it was possible to enhance lung damage with oxygen whether damage was caused by methylcyclopentadienyl manganese tricarbonyl (MMT), bleomycin, cyclophosphamide or inhaled cadmium chloride. Interestingly we found a species difference; in rats we could only potentiate lung damage produced by the two anticancer drugs, cyclophosphamide and bleomycin; cadmium chloride or MMT damage could not be potentiated with oxygen. Validation of the mouse lung adenoma assay was a second major research effort. To validate this assay, we treated A/J mice with a total of 36 compounds. Although we do not know the exact identity of the compounds studied, we already know and tentatively conclude that, contrary to prior expectations, the lung tumor assay will not be a suitable in vivo bioassay for carcinogenesis. We also did additional work on the promotion of lung tumors in mice by BHT. We have now established that BHT is also effective as a promoting agent if fed to mice in the diet. Five tests are

used routinely to evaluate the toxicity of synthetic fuels and the associated substances resulting from their production from coal or petroleum: acute oral and intraperitoneal toxicity in mice (LD_{50}); acute dermal toxicity in rats; skin and eye irritation in rabbits, and delayed-type allergic sensitivity in guinea pigs. We are also testing in vivo selected substances for their effect on the in vitro proliferative capacity of colony-forming cells of mouse bone marrow.

24443 (ORNL—5927, pp 143-146) **Induction and progression of neoplasia in tracheal epithelium.** Marchok, A.C.; Klein-Szanto, A.J.P.; Epler, R.G.; Huang, S.F.; Klann, R.; Phipps, L.H.; Rice, R.; Shiba, M.; Wasilenko, W. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

The respiratory tract of man is continually accosted by hazardous agents in the environment that are potentially carcinogenic, cocarcinogenic or which may promote the development of lung cancer. Many of these hazardous agents are introduced into the environment as particulates, gases, aerosols, etc. during the refining and utilization of most, if not all, energy sources. There is a great need to develop mammalian model systems that will test for these potentially hazardous agents under experimental conditions that are well controlled in terms of target site exposed, as well as dose and duration of exposure to the agent. It is also important to define and use endpoints that are relevant to the human situation. Therefore, in this program, in vivo, in vivo-in vitro and in vitro models have been developed and are utilized to define and quantify cellular changes that identify particular stages in the evolution of neoplasia in the epithelium of the rat trachea, a tissue which is similar to the human bronchus. These models are described.

24444 (ORNL—5927, pp 146-148) **Normal and neoplastic growth in epithelial cells.** Terzaghi, M.; Klein-Szanto, A.J.P.; Martin, D.H.; Phipps, L.H.; Sega, M.W.; Riester, L. Dec 1982. NTIS, PC A13/MF AO1.. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

The development of neoplastic disease in vivo is characterized by a long asymptomatic latency period. The length of this latency period is dependent on the dose, dose rate, and potency of carcinogenic insult. We have developed an in vitro technique referred to as the epithelial focus (EF)-assay whereby quantitative and qualitative changes taking place soon after carcinogen exposure can be monitored. Cells giving rise in vitro to EF which survive and proliferate when seeded into culture dishes were frequently observed immediately after carcinogen-exposure in rat trachea, esophagus, and lung. Three types of EF could be distinguished experimentally: EF which could not be subcultured (EF_0); EF that could be subcultured (EF/sub s/); and EF/sub s/ which did not grow in agarose (EF/sub s,ag/-); and EF/sub s/ which did grow in soft agarose (EF/sub s,ag/+). We previously investigated the effect of carcinogen-dose and time elapsing post exposure on the dynamics of neoplastic development in implanted rat tracheal epithelium as determined by changes occurring in the EF, EF_0, EF/sub s/, EF/sub s,ag/+ and EF/sub s, ag/- forming units (cell populations) in vivo. More recently, we have carried out similar experiments examining the effects of the promoter TPA on the carcinogen. We have developed a technique referred to as tracheal repopulation whereby the growth of normal and preneoplastic epithelial cells previously isolated in vitro can be studied in vivo in de-epithelialized tracheal implants. Unfortunately, little information could be gained from these experiments due to the high frequency of immunologic (macrophage) rejection observed particularly in those irradiated nude mice implanted with tracheas containing cells subsequently exposed to either TPA or MNNG.

24445 (ORNL—5927, pp 148-150) **Inhalation toxicology.** Dalbey, W.E.; Lock, S.; Garfinkel, S.; Stenglein, F.J. Jr. Dec 1982. NTIS, PC A13/MF AO1. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1981.

An unusual use of diesel fuel is in the production of a visual obscurant by the military. We have produced in the laboratory an aerosol by flash vaporization of diesel fuel, in the absence of oxygen, and subsequent recondensation, that resembles that produced by the military under field conditions. The aerosol is then used in rat studies to determine the potential health effects of this visual obscurant. The first phase of this work was to establish a maximum tolerated concentration for single exposures of animals. Results from the above studies were used to design a protocol for a series of experiments in which animals were exposed a total of nine times once per week or three times per week. The purpose of these experiments was to determine the relative importance of concentration (1.2 to 6 mg/l), duration of exposure (2 h vs. 6 h) and frequency of exposure. A matrix design was used in order to reduce the impact of shipment and other block effects. Following exposure pulmonary function, startle responsiveness and the phagocytic activity of pulmonary free cells were studied. Tests were carried out either two days or two weeks after the end of exposure. The main effect appeared to be related to diesel fuel aerosol concentration; however, both duration and frequency of exposure did have some minor influence, particularly on pulmonary function. In ongoing work we are looking at the longer term (3 month) effects of low concentrations (0.25 mg/1 to 1.5 mg/1) on animals exposed for 4 h per day, twice per week.

24446 (ORNL—5927, pp 150-154) **Dermal Pathology Program.** Holland, J.M.; Shugart, L.R.; Kao, J.Y. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The focus of this program has been to characterize the local and systematic toxicity of topically applied synthetic fossil liquids. Activity is organized into four overlapping but independent areas: (a) quantitative analysis of skin carcinogenesis; (b) in vitro evaluation of local cutaneous toxicity and chemical-skin interaction; (c) the dosimetry of PAH carcinogens in skin; and (d) extrapolation and risk estimation. Detailed discussion of each area accompanies this overview and summary. Substantial progress has been made in the first three areas, and we have every reason to believe that accumulating information will advance our ability to accurately predict potential health impacts associated with human percutaneous exposure to synthetic fossil liquids.

24447 (ORNL—5927, pp 154-157) **Cardiovascular toxicology.** Revis, N.; Becker, P.N.; Hall, G.V.; Kark, J.B.; Schiller, C.A. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Two major studies were conducted during this period: (a) the effect of cadmium on the arterial system in various strains of rats, and (b) the dose-response effect of calcium and iron on lead and cadmium-induced hypertension and atherosclerosis. These studies are described. We are presently engaged in studies designed to determine (i) the dose-response effects of calcium and iron on the accumulation of lead in various tissues and on lead-induced hypertension and atherosclerosis, and (ii) the dose-response effects of calcium on the accumulation of cadmium in various tissues and on cadmium-induced hypertension and atherosclerosis.

24448 (ORNL—5927, pp 158-160) **Chemical effects on the immune system.** Perkins, E.H.; Glover, P.L. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

In an effort to explore the effects of selected energy related and non-energy related chemicals on immunity and host defense mechanisms, two primary areas are under investigation. The first is mechanistic studies aimed primarily toward understanding the role of the immune system in chemical carcinogenesis. In contrast to spontaneously arising tumors, tumors arising following treatment with chemical carcinogens often bear specific non-crossreacting neoantigens. Under these circumstances altered immune competence could be of significance in initiation and progression of tumor growth. We have demonstrated a positive correlation between declining immune competence and early mortality associated with diethylnitrosamine (DEN) carcinogenesis in aging mice. Comparative studies using mice of three different immunologic constitutions demonstrated that decreased immune competence enhanced squa-

mous forestomach carcinogenesis, had no effect on DEN-induced liver tumors and decreased the incidence of induced lung adenomas. The lack of correlation between tumor induction of different tumors in three different organs and altered immune competence demonstrates the importance of both immunologic (e.g., immunogenicity) and non-immunologic factors. The second area is the establishment of the technology to evaluate the activity of suspect chemicals with regard to immunologic toxicity and to obtain fundamental information on the immunodestructive effects and reversibility or recovery from such insults, i.e., the acute and chronic effects of such injury at or near environmental levels, and further to determine an order of magnitude for significant immunosuppresive activity, successful recovery and/or subsequent late effects. In vitro antibody production has proved to be a sensitive and economical screening system to recognize potentially toxic substances.

24449 (ORNL—5927, pp 166-171) **Regulation of gene expression.** Kenney, F.T.; Lee, K.L.; Isham, K.R.; Stringfellow, L.A.; Balogh, L.A.; Johnson, A.C.; Rothrock, R.S.; Tindal, M.H. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The objectives of this research are to define in molecular terms the mechanisms controlling expression of specific genes in mammalian cells, how these effect the process of differentiation, how they are regulated by hormones and other specific effectors, and how they are altered in the dysfunction of gene expression in cells transformed to malignancy. Much of our work is focused on expression of the rat liver enzyme tyrosine amino transferase (TAT), a convenient model since expression is modulated in several important ways and the system is amenable to detailed biochemical analysis. Recent results have provided reagents that permit comparative analyses of other genes expressed in liver and exhibiting interesting regulatory properties. Significant progress has been made in a number of experimental approaches.

24450 (ORNL—5927, pp 179-181) **Cytometrics.** Mullaney, P.F.; Braslawsky, G.R.; Mann, R.C.; Hand, R.E. Jr. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The major goal of this program is to develop new approaches using flow-cytometric measurement techniques that can identify and quantitate cellular changes that occur as a result of toxic or mutagenic agents. Major areas of investigation involve methods to improve data and image analysis and application of those methods to biological assay systems.

24451 (ORNL—5927, pp 181-184) **Carcinogen activity in human and rodent cells and tissues.** Selkirk, J.K.; MacLeod, M.C.; Tong, S.; Mansfield, B.K.; Noghrei-Nikbakht, P.A. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

Our laboratory has progressed in a number of areas in understanding the carcinogenic potential of both polyaromatic carcinogens and nitrogen-containing heterocycles, which are proving to be powerful mutagens and carcinogens and are major components of fossil fuel combustion. Earlier work in our laboratory suggested that the major reason for the lack of carcinogenic potential of benzo[e]pyrene was its inability to metabolize a reactive bay-region diol-epoxide. It appeared that the major pathway for metabolism by the monooxygenase system was at the opposite side of the molecule in the K-region. These observations have been extended to include early and later time points of metabolism of benzo[e]pyrene by hamster embryonic cells. We have continued our studies attempting to understand the stereochemical specificity of benzo[a]pyrene diol-epoxides with cellular macromolecules. A series of experiments have been initiated to determine the parallelism between polycyclic hydrocarbon carcinogenesis as major products of fossil fuel combustion and nitrogen-containing heterocyclics which appear to form in high-pressure lower-temperature combustion systems as seen in diesel engines. The metabolism of two nitrogen-containing polycyclic aromatic hydrocarbons, 6-nitrobenzo[a]pyrene and 10-azabenzo[a]pyrene, which are known environmental contaminants and mutagens, was studied in hamster embryonic cells and cell-free systems using microsomal homogenates prepared from liver. Covalent binding of 6-nitrobenzo[a]pyrene and 10-azabenzo[a]pyrene to nuclear macromolecules was also investigated and compared to the binding profiles seen for benzo[a]pyrene.

24452 (ORNL—5927, pp 185-190) **Skin carcinogenesis: tumor initiation and promotion.** Slaga, T.J.; Davidson, K.A.; Fischer, S.M. Dec 1982. NTIS, PC A13/MF A01. Order Number DE83004230.

In Biology Division progress report, June 1, 1980-July 31, 1982.

The overall goal of this research program is to investigate and understand the mechanisms whereby the polycyclic aromatic hydrocarbon (PAH) carcinogens cause skin cancer. This problem is being approached by both in vivo as well as in vitro studies using cultured keratinocytes. Skin carcinogenesis can be divided into at least two distinct stages, referred to as initiation and promotion; the components of each stage can be defined and studied individually. More recent studies have shown that the tumor promotion stage can be further divided into two and possibly three stages. Use of different kinds or classes of tumor promoters has added significantly to understanding those events that can cause promotion. Inhibitors and stimulators of tumor initiation are being employed to better determine the critical events in PAH tumor initiation with particular regard to promotion are being determined through the use of modifiers, especially those specific for one or more of the promotion stages. Currently, the importance of the increase in dark cells that are thought to be primitive stem cells, the changes in states of differentiation and the role of prostaglandins in promotion are being pursued.

24453 **(PB—83-134767) Roofing asphalts, pitch and UVL carcinogenesis.** Thayer, P.S.; Menzies, K.T.; von Thuna, P.C. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Nov 1981. 125p. NTIS, PC A06/MF A01.

The tumorigenicity to mouse skin of volatile components of roofing asphalts and coal tar pitches was investigated. Male CD-1 and C3H/H3J-mice were exposed to 25 milligrams per application of ashpalt volatiles or 1.5 to 4.2 milligrams per application of pitch preparations. Treatment was twice weekly for an 18 month period with two temperatures of generation of volatile materials and exposure or lack of exposure to simulated sunlight. The C3H strain of mice was more sensitive to the tumorigenic activity, while simulated sunlight had an inhibitory effect on the rate of appearance of tumors but not on the final tumor incidence. The higher temperature of preparation of the asphalt volatiles resulted in greater tumorigenic activity. The authors conclude that the asphalt volatiles were almost as tumorigenic and carcinogenic to C3H-mice as the pitch volatiles.

24454 **(PB—83-145003) Utilization of surface mine ponds in East Tennessee by breeding amphibians. Final report.** Turner, L.J.; Fowler, D.K. (Tennessee Valley Authority, Norris (USA)). Jun 1981. 22p. NTIS, PC A02/MF A01.

Breeding amphibians were found in 21 of 24 ponds examined on the Ollis Creek Surface Mine in Campbell County, Tennessee. Twelve species of amphibians were identified in ponds that range from 4.0 to 8.0 in pH. Although ponds with low pH values were used by breeding amphibians, significantly more amphibian species were found in ponds with higher pH values. Findings indicated high biological productivity in the surface mine ponds examined. Aquatic vegetation was present in 20 of the 24 ponds. Aquatic insects and a diverse wildlife fauna utilized the study ponds. Surface mine ponds were found to supply an important habitat component for a variety of wildlife species.

24455 **Variation in photosynthesis and stomatal conductance in an ozone-stressed ponderosa pine stand: light response.** Coyne, P.I. (Southern Plains Range Research Station, Woodward, OK); Bingham, G.E. *Forest Science;* **28**: No. 2, 257-273(1982). Contract W-7405-ENG-48.

The seasonal course (May to October 1977) of gross photosynthesis (from $^{14}CO_2$ uptake and stomatal conductance) in a stand

of ponderosa pine (Pinus ponderosa Laws.) in the San Bernardino National Forest was characterized as a function of light. Nine sapling trees, classified for comparative studies into three chronic injury classes (slight, moderate, severe) had experienced oxidant fumigations from California's South Coast Air Basin for approximately 18 years, since their establishment following fire. The CO_2-transfer pathway was partitioned into its stomatal and residual (mesophyll, carboxylation, excitation) resistance components, for conditions of light saturation and 20°C. Light-saturated gross photosynthetic rates and photochemical conversion efficiencies were highest in the current-year needles and decreased with increasing needle age and oxidant injury. Maximum stomatal conductance and stomatal sensitivity to increasing light during stomatal opening followed a trend similar to that of photosynthesis, except for current-year needles, where conductance parameters were highest in the severely injured trees. This higher conductance may contribute to observed differential ozone sensitivity in ponderosa pine. Premature senescence and abscission of the 1-year (severely injured trees) and 2-year (slight to moderate injury) needles occurred at about the time CO_2 uptake dropped to 10% of the potential for current needles of slightly injured trees without foliar injury symptoms. The ratio of stomatal CO_2 resistance to the total CO_2 resistance decreased with increasing oxidant injury and needle age, suggesting that loss of photosynthetic capacity was primarily related to the loss of chloroplast function rather than to increased resistance of CO_2 diffusion through the stomata.

24456 **Mutagenicity of diesel exhaust particle extracts: influence of driving cycle and environmental temperature.** Clark, C.R. (Inhalation Toxicology Research Inst., Albuquerque, NM); Dutcher, J.S.; Brooks, A.L.; McClellan, R.O.; Marshall, W.F.; Naman, T.M. *Fundamental and Applied Toxicology;* 2: No. 7-8, 153-157(1982). Contract AC04-76EV01013.

General Motors and Volkswagen diesel passenger cars (1980 and 1981 model year) were operated on a climate controlled chassis dynomometer and the particulate portion of the exhaust was collected on high volume filters. Dichloromethane extracts of the exhaust particles (soot) collected while the cars were operated under simulated highway, urban and congested urban driving cycles were assayed for mutagenicity in Salmonella strains TA-98 and TA-100. Driving pattern did not significantly influence the mutagenic potency of the exhaust particle extracts or estimates of the amount of mutagenicity emitted from the exhaust despite large differences in particle emission rates and extractable fraction of the particles. Mutagenicity of extracts of exhaust particles collected while the vehicles were operated at test chamber temperatures of 25, 50, 75, and 100°F were also very similar. The results suggest that driving pattern and environmental temperature do not significantly alter the emission of genotoxic combustion products from the exhaust.

24457 **Ebb and flow of manganese: a possible pathogenic factor in birth defects, cancer and heart disease.** Marienfeld, C.J.; Collins, M. (Univ. of Missouri, Columbia). *Trace Substances in Environmental Health;* **15**: 3-20(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Manganese is essential and ubiquitous in all living matter and has been considered as one of the least toxic of the elements. However, 14 years ago at this meeting, Cotzias demonstrated a severe Parkinson-like disease among Mn miners. He further showed that the primitive homeostatic mechanism for Mn in man was based almost entirely upon its excretion by the liver via the bile. The lack of storage capacity for Mn and its rapid uptake by mitochondria lead to a rapid and intermittent rise and fall of blood and tissue levels. A similar rise and fall of Mn occurs in water sources, in water treatment and distribution systems and in the preparation of some food beverages. Manganese has been a known and consistent mutagen in both prokaryotes and eukaryotes since the work of Demerec and Hansen in 1951. It produces error prone DNA replication when substituting for magnesium in polymerase enzyme reactions. We have only recently become aware of the degree to which manganese has been relegated to the status of human ecologic immateriality. This conclusion was reached after a preliminary literature search for the possible relevance of a high Mn level found in the drinking water to the high birth defect rate experienced by a community in Missouri. The present aim will be to indicate in agreement with Cotzias that Mn, like other trace elements, is deserving of much more scientific attention and infinitely more respect than it has been receiving. The hit and run mutagenic potential of Mn in the pathogenesis of birth defects, cancer and heart disease is discussed.

24458 **Mortality as influenced by alteration of Pennsylvanian shale by strip mining of coal.** Kagey, B.T. (State Univ. of New York, Brooklyn); Adler, A.; Pottinger, H. *Trace Substances in Environmental Health;* **15**: 23-28(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The strip mining of coal within Missouri results in the disruption of the Pennsylvanian shale giving an increase in surface area which may result in a greater contribution of constituent materials to the regional water supplies. County water quality data for Missouri were found to be reflective of the underlying geology. Thus, in studying the health effects associated with mine drainage, the relationship between mortality and geochemistry and altered geochemistry must be determined to avoid invalid conclusions. While accounting for sociodemographic variables, age-adjusted mortality rates were studied with respect to both the influence of the underlying geochemistry and the strip mining of coal - the alteration of existing geochemistry. Multivariate analyses were used to assess the overall relation between mortality and geochemistry. Cause-specific mortality is discussed.

24459 **Smoking, infant birthweight and lead burden in developing children.** Lubin, A.H.; Shrock, R.O.; Signs, S.A.; Kasler, J.S. (Ohio State Univ., Columbus). *Trace Substances in Environmental Health;* **15**: 29-34(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Ninety women, 29% of pregnant women ($n = 309$) enrolled in a longitudinal study determining the effects of environmental factors on the infants' subsequent growth and development, were identified as smokers. They were compared with an equal number of women radomly selected from the same investigation who were nonsmokers. Smoking mothers produced significantly lower birthweight infants ($p < .005$) and also had higher blood lead levels at the third trimester. The progeny of these women were monitored for 2 years and values at 6, 12, 18 and 24 months all demonstrated a trend for the children of smoking mothers to have higher blood Pb levels which was significant ($p < .001$) at the child's first birthday. In addition FEP, hemoglobins, hematocrits, Fe, TIBC and %Sat were performed at each of these intervals. There was no significant difference between the smoking and nonsmoking groups. We believe that the lack of a similar trend for these biochemical analyses tends to implicate further the role of cigarette smoking and tobacco smoke in producing lower birthweight infants and predisposing those infants to an environmental hazard of undue body Pb burden.

24460 **Relationship between gastric cancer and blood trace metal levels.** Saito, K.; Fujimoto, S.; Sasaki, T.; Kurasaki, M.; Kaji, H. (Hokkaido Univ., Sapporo, Japan). *Trace Substances in Environmental Health;* **15**: 25-44(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The metal concentrations in whole blood, blood plasma and blood cells of the patients were compared with those of normal subjects. Significantly lower levels of Cd, Mn, Pb and Zn in whole blood of the patients were found. The Cu levels in the blood cells and Zn levels in the blood plasma of patients were of definitely lower levels than those of the normal subjects. Superoxide dismutase (SOD), catale (CAT), glutathione peroxidase (GPX) and delta aminolevulinic dehydratase (ALAD) metal enzymes were assayed in the 30 patients and in 24 normal subjects matches in age to the patients. SOD levels in blood cells of the patients were definitely lower than those of the normal subjects. The CAT activities showed a significantly higher level in the stage II and a significantly lower level in the stage IV and metastatic groups. The activities of GPX and ALAD did not show any significant difference be-

tween the patients with gastric cancer and the normal subjects. There were significant negative correlations between CAT activity in whole blood and Cu level in whole blood and blood plasma; also, positive correlations between Zn level and in whole blood and CAT activity, and between Zn level and GPX activity in patients with gastric cancer. Moreover there were positive correlations between Zn level and SOD level in the blood cells and also a negative correlation between Zn level in blood cells and GPX activity in whole blood. These correlations suggested that there may be some important relationship between the metabolism of superoxide anion in gastric cancer patients and advanced cancer.

24461 **Effect of phosphorus and calcium on zinc metabolism in man.** Spencer, H.; Kramer, L.; Lesniak, M.; Norris, C.; Coffey, J. (Veterans Administration Hospital, Hines, IL). *Trace Substances in Environmental Health;* **15**: 45-53(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The effect of phosphorus on zinc metabolism was studied in adult men receiving different calcium intakes ranging from 200 to 2000 mg/day. The diet and urinary and fecal excretions were analyzed for Zn, P and Ca. Metabolic balances of these elements were determined for several weeks in each study phase. In control studies the dietary intake was 800 mg/day and in the experimental studies it was increased to 2000 mg/day by adding sodium glycerophosphate to the constant diet. The dietary Zn intake averaged 14.5 mg/day in the different studies. These studies have shown that increasing the P intake by a factor of 2.5, from 800 to 2000 mg/day, did not affect urinary or fecal Zn excretions nor the Zn balance. Similar results were obtained on increasing the Ca intake from 200 to 2000 mg/day.

24462 **Zinc and magnesium concentrations in plasma and red blood cells in patients on digitalis medication.** Zumkley, H.; Bertram, H.P.; Vetter, H.; Zidek, W.; Wessels, F. (Medizinische Universitaets Poliklinik, Muenster, Germany). *Trace Substances in Environmental Health;* **15**: 54-60(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Determinations of zinc, sodium, potassium and magnesium in plasma and red blood cells (RBC) were performed in 31 controls and 63 patients treated with digitalis. In digitalized patients Na and Zn concentrations in RBC were significantly increased, whereas the intraerythrocyte Mg concentration was only slightly elevated. Plasma concentrations of all investigated electrolytes as well as of Zn remained within the normal range. There was a close relationship between the increase of Na and Zn content in RBC indicating alterations in transmembrane transport mechanisms induced by digitalis therapy.

24463 **Problems associated with heavy metals in drinking water.** Strain, W.H.; Varnes, A.W.; Paxton, C.A.; Drenski, T.L.; Hill, O.A. Jr. (Cleveland Metropolitan General Hospital, Cleveland, OH). *Trace Substances in Environmental Health;* **15**: 104-110(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Numerous problems are associated with investigating heavy metals in drinking and household water. Increased levels of the heavy metals usually indicate costly corrosive action and suggest the development of adverse health effects. Screening for the various metals is most easily carried out by inductively coupled plasma (ICP) arc spectrometry and improvements that are just being perfected will improve determinations of arsenic, lead, mercury and selenium. Since low pH favors corrosion and the build up of heavy metals, the effect of alkaline waters on corrosion and health should be investigated thoroughly. This has become possible through the publication in 1980 of Geographic Factors in the Risk of Drying and Associated Factors by Herbert Sauer. Is the better health of the Great Plains states due to alkaline waters? Is acid rain toxic to people as well as fish? These issues may be examined by computer analysis of health and water quality and experimental approaches through use of reverse osmosis water units.

24464 **Effect of starvation on ^{65}Zn tissue distribution and excretion by rats.** Menczel, J.; Lender, M.; Spencer, H. (Veterans Administration Hospital, Hines, IL). *Trace Substances in Environmental Health;* **15**: 113-120(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The effect of starvation on the excretion and tissue distribution of zinc in rats was investigated by using $^{65}ZnCl_2$(6μc) as the tracer intraperitoneally. The control group was fed a semi-liquid diet and the starvation group received distilled water only. Complete urine and stool collections were obtained. After 4 days of starvation the rats lost 21% of the initial weight vs. 6.8% for the control animals. Fecal ^{65}Zn excretion was higher than urinary excretion in both groups; however, the fecal ^{65}Zn of the starved rats was lower than that of the control group (30.5% vs. 36.8%, respectively). The ^{65}Zn concentration per ml urine of the starved rats was similar or even higher than that of the control group; however, the total urinary ^{65}Zn excretion was lower during starvation, 0.34% of the dose, due to the lower urine volume, vs 0.99% for the control group. The rats were sacrificed on day 4 and samples of blood, multiple soft tissues and bone were obtained. The ^{65}Zn uptake was higher in all soft tissues of the starved rats than of the control rats, except for the pancreas. The ^{65}Zn uptake in bone was similar in both groups.

24465 **Comparative toxicity to weanling and adult rats of lead acetate in water.** Rader, J.I.; Celesk, E.M.; Peeler, J.T.; Mahaffey, K.R. (Food and Drug Administration, Cincinnati, OH). *Trace Substances in Environmental Health;* **15**: 131-143(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The relative toxicity of lead acetate provided at uniform exposure levels (μg/ml in water) or at uniform dosages (mg/kg body wt) was studied in groups of weanling and adult rats. Free erythrocyte protoporphyrins, urinary δ-aminolevulinic acid and blood Pb levels were measured. The accumulation of Pb in brain, kidney and bone (femur) was measured to determine the effect of age on tissue distribution and retention of Pb. Under conditions in which both weanling and adult rats were exposed to the same concentrations of Pb in drinking water, toxic effects of the metal were more pronounced in weanlings than in adults. This was due in part to higher doses of Pb per kg of body weight ingested by the young animals under these conditions. Under conditions of uniform dosage, retention of Pb (as % of ingested dose) in brain tissue and femur was significantly higher in weanling than adult animals.

24466 **Effect of dietary manganese on the respiratory activity of liver mitochondria.** Sun, A.Y.; Chang, B.P.; Corpus, V.; Smith, G.; Marienfeld, C.; Middleton, C. (Univ. of Missouri, Columbia). *Trace Substances in Environmental Health;* **15**: 144-153(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Manganese, like calcium, can readily uncouple mitochondrial respiration. An acute dose of $MnSO_4$ (800 mg) administered to rats did not seem to alter the respiratory activity of mitochondria. However, subchronic administration of $MnSO_4$ (800 mg/day by intragastric intubation for 8 days) substantially increased both state 3 and state 4 respiration. Mitochondrial Ca^{2+} uptake was lowered under the same condition. The increase in state 3 respiration may be due to enhanced nucleotide translocase activity through biological adaptational change.

24467 **Increasing total and biologically active chromium in wheat grain and spinach by spraying with chromium salts.** Vicini, F.A.; Ellis, B.G. (Michigan State Univ., East Lansing). *Trace Substances in Environmental Health;* **15**: 154-159(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Recently, chromium has been shown to be necessary for glucose metabolism in man. But most plant species greatly restrict the uptake of Cr. This study was conducted to determine if both total and biologically active Cr could be increased in wheat grain or

spinach by spraying the plants with either $Cr_2(SO_4)_3$ or Cr-EDTA. Concentrations of Cr in wheat grain were about doubled in a greenhouse experiment by spraying with either Cr source. Biologically active Cr (estimated by extraction with ethanol or NH_4OH) was increased from about 40 to greater than 50% of total Cr when wheat was sprayed with Cr salts. Total Cr in spinach leaves was increased by as much as 10-fold by spraying, with the sulfate source being more effective than the EDTA.

24468 **Lead and iron status of breast and formula-fed infants.** Lubin, A.H.; Kasler, J.S.; Shrock, R.O.; Signs, S.A. (Ohio State Univ., Columbus). *Trace Substances in Environmental Health;* **15**: 166-170(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

We examined the iron and lead status of breast-fed and formula-fed infants from birth through the first year of life. Not only has the adequacy of iron intake of breast and formula-fed infants been questioned but also the contamination of breast milk with environmental pollutants such as Pb. In addition, it is believed that a state of Fe deficiency may promote the absorption of Pb. We compared the blood Pb and Fe levels of 23 breast-fed and 23 formula-fed infants whose mothers were enrolled in a longitudinal study determining the effects of maternal nutritional and environmental factors on the infants' subsequent growth and development. Serum iron, TIBC and %SAT values were obtained at 6 and 12 mo. Additional biochemical values including Pb and erythrocyte protoporphyrin (EP) concentrations were obtained at birth and 1, 2, 4, 6, 9, and 12 mo. Iron status was similar at 6 mo for the breast-fed and formula-fed infants, but somewhat higher for the breast-fed infants at 12 mo (NS). Results indicate no differences in Pb or EP status between breast-fed and formula-fed infants. Biochemical values were within normal limits. We conclude that dietary intake of Pb and Fe by infants whether breast-feeding or formula-feeding reflects adequate Fe status and apparent safe Pb state.

24469 **Effects of supplemental mangesium on blood and tissue lead levels and toxicity of ingested lead in the rat.** Mylroie, A.A.; Hickmon, T.; Hill, G. (Chicago State Univ., IL). *Trace Substances in Environmental Health;* **15**: 178-183(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Dietary magnesium supplementation has been reported to lower retention and to increase excretion of lead in Pb treated rats, thus reducing the total body burden and the toxic effects of Pb. In order to determine the effects of Mg in our studies, purified diet containing 0.05% Mg was supplemented with 0.1% Mg (as MgO) and fed to groups of weanling Sprague Dawley rats; Pb was added to the drinking water (0, 250, 500 and 1000 ppM $Pb(C_2H_3O_2\ 3H_2O)$ for 5 to 6 weeks in a series of experiments. Blood levels were exceedingly high (10 to 28 mg Pb/ml) at the end of the experimental period compared to values (0.9 to 2.4 μg Pb/ml) obtained in rats receiving unsupplemented diet. Similarly, spleen Pb, like blood Pb levels, were up to 20 times higher in rats fed Mg supplemented diet. Lead levels increased in liver (80 to 400%) and brain (17 to 100%); bone and kidney Pb concentrations were unchanged in one experiment (5 weeks) but increased in a second experiment (6 weeks) as a result of Mg supplementation. Increases in tissue Pb levels were not accompanied by comparable increases in Pb induced anemia. Magnesium supplementation (0.1%) of a nutritionally adequate purified diet, at a total conc of Mg that is lower than in stock diets like Purina Chow (0.2% Mg), results in an increased body burden of Pb and unprecedented high blood and spleen Pb levels under the experimental conditions.

24470 **Effect of dietary lead and calcium on tissue lead accumulation and depletion in sheep.** Pearl, D.S.; Ammerman, C.B.; Henry, P.R.; Littell, R.C. (Univ. of Florida, Gainesville). *Trace Substances in Environmental Health;* **15**: 184-189(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

An experiment was conducted to study the effect of dietary lead and calcium on tissue accumulation and depletion of Pb in sheep. In a feeding trial 40 wether lambs, 56 kg initially, were assigned randomly to 2 dietary treatments: .25% Ca + 1000 ppM Pb or .50% Ca + 1000 ppM Pb. Supplemental Ca was supplied as reagent grade calcium carbonate and Pb as reagent grade lead acetate. The experiment was divided chronologically into 2 phases of 75 and 180 days, respectively. During the first phase, diets contained 1000 ppM supplemental Pb and during the second phase, 3 ppM Pb. The 2 levels of Ca were fed throughout both phases. Two sheep from each treatment group were euthanized at intervals during each period and selected tissues removed for mineral analyses. Lead accumulation and depletion curves were generated in kidney, liver and bone. Lead increased in all tissues during the accumulation period and decreased during the depletion period. The mean liver Pb concentration for sheep killed at the beginning of the experiment was 1.1 ppM (dry matter basis) and it increased to 13.5 ppM in the livers of sheep euthanized at the end of 75 days and decreased to 3.0 ppM after being depleted for 180 days. Tissue Pb returned to initial values in kidney but did not in liver or bone by the ened of the 180 day depletion period. There was no effect of increased dietary Ca on the accumulation or depletion of tissue Pb except for liver where increased dietary Ca reduced ($p < .05$) the amount of Pb deposited.

24471 **Cadmium-copper interaction: tissue accumulation and subcellular distribution of cadmium in mice after simultaneous administration of cadmium and copper.** Bourcier, D.R.; Sharma, R.P.; Brinkerhoff, C.R. (Utah State Univ., Logan). *Trace Substances in Environmental Health;* **15**: 190-197(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

In vivo cadmium with copper was investigated using mice exposed to various combinations of Cd and Cu concentrations in drinking water. Animals were sacrificed at 0, 3, 6, 9 and 12 wk and brain, liver, kidney and spleen digests analyzed for cadmium, copper, iron and zinc by flame or flameless atomic absorption spectrophotometry. Tissue Zn, Fe and Cu levels were not altered by Cu or Cd additions to drinking water. Although a dose related increase in Cd was observed in kidney and liver throughout the experiment, a significant decrease was observed in Cd concentrations of these 2 tissues when 100 ppM Cu was added to 5 ppM Cd in drinking water but not when Cd levels were increased to 25 ppM or when Cu was reduced to 25 ppM. In order to determine the intracellular location of the increased Cd in these tissues, nuclei, microsomes, mitochondria and soluble proteins were isolated from liver and analyzed for Cd and Cu. Cadmium levels in the soluble protein fraction of liver of animals administered 5 ppM Cd were ~ 3-fold greater than that for the same Cd dose when Cu was added. The same was the case for the low molecular weight fraction (TCA supernatant) of liver. At the same time, Cu increased in both the total soluble protein and low mol wt protein fractions of Cd exposed animals when Cu was added. These results suggest an in vivo replacement of Cu for Cd in induced metallothionein-like Cu and Cd binding proteins. Copper at relatively low levels may play an important role in the prevention of accumulation of Cd in liver and kidney; however, this interaction appears to be dependent on a specific Cd:Cu ratio of metal intake.

24472 **Serum copper, follicular stimulating hormone, luteinizing hormone, prolactin, spermatic count, viability, progression and seminal zinc correlations in a human (male) infertility study.** Sella, G.E. (Laval Univ., Quebec City, Canada); Cunnane, S.C.; McInnes, R.A. *Trace Substances in Environmental Health;* **15**: 198-207(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The role of copper and its correlations to other parameters has been investigated in a male-fertility pilot study at a University infertility clinic in Montreal. Serum and semen Cu concentrations were determined in 100 men (age 25 to 54 years) referred to the clinic for infertility evaluation. The results of the significant correlations between serum Cu concentrations and male fertility parameters such as (1) the serum concentrations of the hormones FSH, LH and prolactin; (2) spermatozoal count, viability and progression and (3) seminal zinc concentrations are reported.

24473 **Analytical measurements of selected metals in samples from a human metabolic study.** Sutton, D.C.; Rosa, W.C.; Legotte, P.A. (Dept. of Energy, New York, NY). *Trace Substances in Environmental Health;* **15**: 270-278(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Diet, stool and urine samples were collected and processed at the Hines Veterans Hospital in Illinois. Representative aliquots were obtained by our laboratory and prepared by wet or dry ashing, then analyzed for Cu, Mn, Cd, and Pb using electrothermal atomic absorption or direct current plasma emission spectrometry. The concentrations of 2 major cations, Mg and Ca, were determined and used to identify the different metabolic diets from this study. Ratios of Cu, Mn, Cd and Pb, respectively, th these major cations and of the trace metals to each other were calculated and used to check for sample homogeneity. The precision between blind duplicate diet and excreta samples is discussed based on our comparion of the wet, dry and ash weight data. The results of analysis are presented for a group of metabolic samples using the above criteria.

24474 **Role of soil ingestion in the intake of metals by livestock.** Thornton, I.; Abrahams, P. (Imperial College, London, England). *Trace Substances in Environmental Health;* **15**: 366-371(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

Studies in the UK have shown that 1 to 18% of the total dry matter intake of grazing cattle is soil, accidentally ingested with grass. This is of particular importance in areas where agricultural soils have been heavily contaminated by metalliferous mining and smelting. Calculations based on soil, plant and faecal analysis have shown that 10 to 90% of the lead and arsenic ingested by cattle is directly from soil.

24475 **Accumulation of cadmium and zinc in soil and vegetation from long-term application of wastewater.** Hill, D.C.; Olson, B.H.; Rigby, M.G. (Univ. of California, Irvine). *Trace Substances in Environmental Health;* **15**: 372-382(Jun 1981). (CONF-8106251—).

From 15. annual conference on trace substances in environmental health; Columbia, MO, USA (1 Jun 1981).

The accumulation of Cd and Zn in soils and vegetation irrigated with treated sewage effluents was examined at 3 locations in southern California. The Whittier Narrows site, a groundwater recharge test plot, received secondary effluent through intermittent flooding for approximately 14 years. Fountain Valley, a forested site, was flood irrigated with both primary and secondary effluents for 16 years. The 3 Las Virgenes sites received various amounts of secondary effluent by spray irrigation for 8 years. Elevated levels of Cd and Zn were observed in the upper layers of soil at the Fountain Valley and Whittier Narrows sites. No metal accumulation from wastewater application was found at Las Virgenes. However, Cd was elevated throughout the soil profiles which reflected the Cd-enriched underlying host rock, Monterey Shale. A variety of weed species were examined at the Las Virgenes and Whittier Narrows sites and 4 tree species were studied at the Fountain Valley site. These results indicated that Cd and Zn concentrations in the tissue of most genera paralleled soil levels, but accumulation and exclusion patterns of Cd and Zn can be species dependent and therefore differ at the same site.

24476 **Kinetics of mutation and sister-chromatid exchange induction by ethyl methanesulfonate in Chinese hamster ovary cells.** Jostes, R.; Samson, L.; Schwartz, J.L. (Univ. of California, San Francisco). *Mutation Research;* **91**: 255-258(1981). Contract AC03-76SF01012.

It has been shown in Chinese hamster ovary (CHO) cells that ethyl methanesulfonate (EMS) induces a linear increase in mutation frequency with time during the first 12 h of exposure, after which little further increase is detected. Although the authors suggested that this was due to the decay of EMS, their observation does not comply with predicted kinetics of decay, where one would expect a curve with a constantly decreasing slope that would reach a plateau at a time dependent on the original EMS dose. An alternative explanation for their results is that during the first 12 h of EMS exposure, an error-free DNA-repair system is induced that is analogous to the adaptive DNA-repair system characterized for bacteria and strongly implicated to exist in mammalian cells. Once induced, this system would then repair any further premutational damage caused by residual EMS activity. To determine whether the shape of the EMS mutagenesis curve is due to the decay of the chemical or to a cellular adaptive response, we tested whether or not a previous exposure to 50 μg/ml EMS in any way altered the cells' response to a second 50 μg/ml exposure. Our endpoints were mutations and sister-chromatid exchanges (SCEs) induced in CHO cells. At the same time, we measured the biological half-life of EMS using these endpoints.

5604 Other Environmental Pollutant Effects

REFER ALSO TO CITATION(S) 24481

24477 **(AD-B—066872/3) Effects of electromagnetic radiation on calcium in the brain. Technical report.** Greengard, P.; Douglas, W.W.; Nairn, A.C.; Nestler, E.J.; Ritchie, J.M. (Southeastern Center for Electrical Engineering Education, Inc., Orlando, FL (USA)). Jul 1982. 117p. NTIS, PC A06/MF A01.

Electromagnetic radiation has been reported to alter several aspects of nervous system function. Authors have claimed effects of radiation on calcium efflux from nervous tissue, on thermoregulation, on the blood-brain barrier, and on several other aspects of brain function, including behavioral, electrophysiological, and nuerochemical processes. In most cases, either the results of these studies cannot be confirmed by other investigators or the biological significance of the results is unclear. Most (but not all) investigators accept that radiation alters the efflux of calcium from nervous tissue. But even accepting the validity of these findings, one is left with little indication as to what the results mean for the functioning of the central nervous system. Despite the plethora of studies that demonstrate radiation effects on the blood-brain barrier, the available evidence, together, indicates that permeability of the barrier remains intact except when the exposure involves very high power densities which cause thermal damage.

24478 **(BMFT-FB-HA—79-19) Parameters influencing noise emission during hot-saw and cold-saw operations and noise reduction measures.** Fritz, A.H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 105p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750342.

Portions are illegible in microfiche products.

At the end of the production line, rolled products are cut to commercial lengths. Today, this is done frequently using high-speed circular saws which though they show a high machining or cutting capacity, respectively, still produce a disagreeable grating noise of 115 dB(A) and more. These level determining noises shall be analyzed as to their causes within the scope of the study and reduced by appropriate measures. The influences of various technological parameters on the sound radiation have been examined on a laboratory saw. The levels increase clearly with the advance speed and less distinctly with the cutting speed. An unstable running of the sawing operation (e.g. rattling) results in a raising of the level. The saw blade is to be considered as one of the main radiation sources of the air sound whereby the machining process is to be regarded as the origin. An increase of the saw teeth as well as damping of the saw blade and insulation of the sound conducted through solids enable to achieve level reductions up to 4 dB. Corresponding industrial tests on large saws established level reductions up to 6 dB(A). However, a substantial reduction of the noise could be achieved only when the saw blade was replaced by a separating disc, i.e. by a change in the process. In this way, a level reduction up to 15 dB(A) could be obtained.

24479 **(PB—83-133306) Effect of the electrical field in the membrane of photosynthesis. Final report.** Witt, H.T.; Graeber, P.; Renger, G.; Schlodder, E.; Tiemann, R. (Commission of the European Communities, Luxembourg). [nd]. 111p. NTIS, PC E06/MF E06.

The primary process of the photosynthesis of plants is a vectorial redox reaction within special reaction centres embedded in the photosynthetic membrane. This reaction simultaneously generates a transmembrane electric field, the inside of the photosynthetic vesicle becoming positive with respect to the outside.

24480 **(PB—83-147447) Potential human study populations for non-ionizing (radio frequency) radiation health effects.** Novotney, L.C.; Gravitis, I. (JRB Associates, Inc., McLean, VA (USA)). Dec 1982. 150p. NTIS, PC A07/MF A01.

This research project was initiated to identify potential human populations for future epidemiological studies of the health effects of radio frequency radiation. Through a literature search and contacts with various groups and organizations, numerous occupations and applications of radio frequency radiation (RFR) were identified and evaluated for their suitability for further study. Many populations were eliminated early because their potential exposure to RFR was too limited or data necessary for epidemiological research were unavailable. Eight populations were evaluated in detail and appear to satisfy many of the criteria for epidemiological research and could be useful study groups in an investigation of the health effects of non-ionizing radiation. The eight potential study populations are: RF heat sealer operators, HF (high frequency) tube welder operators, medical diathermy operators in Veterans Administration hospitals, medical diathermy operators in rehabilitation facilities, school children located near broadcasting towers, state policemen, security guards, and radar technicians.

57 HEALTH AND SAFETY

REFER ALSO TO CITATION(S) 23010, 23633

24481 **(EPRI-EA—2895) Definitive studies on pole-top resuscitation. Final report.** Gordon, A.S.; Ridolpho, P.F.; Cole, J.E. (Resucitation Research Lab., Camarillo, CA (USA)). Feb 1983. 60p. NTIS, PC A04/MF A01. Order Number DE83901851.

Portions are illegible in microfiche products.

This report summarizes the history of the application of cardiopulmonary resuscitation to the electric shock victim located at the top of a utility pole. This dramatic and urgent situation requires that rescue be attempted with procedures which are thoroughly understood and effective. Questions related to the use of resuscitation and precordial thump at the pole top were subjected to experimental testing, both in animals and in humans. Results of this study clearly demonstrate the advantages of postponing resuscitation until the victim has been lowered to the ground. The author concludes with seven recommendations for emergency treatment at the scene.

58 GEOSCIENCES

24482 **Application of QA to geoscience investigations.** Henderson, J.T. (Sandia Natl Lab, Albuquerque, NM, USA). *Transactions of the Annual Technical Conference, American Society for Quality Control;* 138-144(1981). (CONF-810503—).

From 35. annual quality congress and exposition; San Francisco, CA, USA (27 May 1981).

This paper discusses the evolution of a classical 'hardware' QA program into the present geoscience quality assurance programs that address eventual NRC licensing, if required. In the context of this paper, QA will be restricted to the tasks associated with nuclear repositories, i.e. site identification, selection, charaterization, verification, and utilization. Similar QA techniques are directly applicable, however, to the other geoscience activities.

5801 Geology And Hydrology

REFER ALSO TO CITATION(S) 23059, 24280, 24282

24483 **(CONF-8003176—) Proceedings of the workshop on nuclear techniques in hydrology.** (Department of Atomic Energy, Bombay (India)). Jan 1982. 308p. NTIS (US Sales Only), PC A14. Order Number DE82904743.

From Workshop on nuclear techniques in hydrology; Hyderabad, India (19 Mar 1980).

Paper copy only, copy does not permit microfiche production.

Separate abstracts were prepared for 27 of the 30 papers in this proceedings of the workshop on nuclear tracer studies in hydrology. Those papers not included were the chairman's remarks at the end of the sessions. (KRM)

24484 **(DOE/ET/44802—T5) Two-dimensional, steady-state model of ground-water flow, Nevada Test Site and vicinity, Nevada-California.** Waddell, R.K. (Geological Survey, Denver, CO (USA)). 1982. Contract AI08-78ET44802. 97p. NTIS, PC A05/MF A01. Order Number DE83009116.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Characteristics of the flow system are principally determined by locations of low-hydraulic-conductivity rocks (barriers); by amounts of recharge originating in the Spring Mountains, Pahranagat, Timpahute, and Sheep Ranges, and in Pahute Mesa; and by amount of flow into the study area from Gold Flat and Kawich Valley. Discharge areas (Ash Meadows, Oasis Valley, Alkali Flat, and Furnace Creek Ranch) are upgradient from barriers. Analyses of sensitivity of hydraulic head with respect to model-parameter variations indicate that the flux terms having the greatest impact on model output are recharge on Pahute Mesa, underflow from Gold Flat and Kawich Valley, and discharge at Ash Meadows. The most important transmissivity terms are those for rocks underlying the Amargosa Desert (exclusive of Amargosa Flat area), the Eleana Formation along the west side of Yucca Flat, and the Precambrian and Cambrian clastic rocks underlying the Groom Range. Sensitivities of fluxes derived from simulated heads and head sensitivities were used to determine the parameters that would most affect predictions of radionuclide transport from a hypothetical nuclear repository in the southwest quadrant of the Nevada Test Site. The important parameters for determining flux through western Jackass Flats and Yucca Mountain are recharge to and underflow beneath Pahute Mesa; and transmissivities of the Eleana Formation, clastic rocks underlying the Groom Range, tuffs underlying Fortymile Canyon, and tuffs beneath Yucca Mountain. In the eastern part of Jackass Flats, the important parameters are transmissivities of the Eleana Formation; clastic rocks underlying the Groom Range; transmissivity of tuffs beneath Fortymile Canyon; and recharge or discharge terms for Pahute Mesa, Ash Meadows, and the Sheep Range. Transmissivities of rocks beneath the Amargosa Desert are important for flux calculations there.

24485 **(LA—9324-MS) Detailed petrographic descriptions and microprobe data for drill holes USW-G2 and UE25b-1H, Yucca Mountain, Nevada.** Broxton, D.; Vaniman, D.; Caporuscio, F.; Arney, B.; Heiken, G. (Los Alamos National Lab., NM (USA)). Oct 1982. Contract W-7405-ENG-36. 72p. NTIS, PC A04/MF A01. Order Number DE83009277.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Drill holes USW-G2 and UE25b-1H at Yucca Mountain, Nevada penetrate a thick sequence of volcanic rocks consisting of voluminous ash-flow tuffs, intercalated with thin bedded tuffs and minor lavas. This report provides detailed petrologic descriptions that were summarized in an earlier report. Microprobe analyses of feldspars and mafic phenocrysts as well as secondary feldspars are tabulated for these drill holes for the first time in this report.

5802 Geophysics

REFER ALSO TO CITATION(S) 23012, 23049, 23050, 24307

24486 **(BMFT-FB-T—79-99) Registration of shear waves.** Janle, H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1979. 59p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750329.

The observation of shear waves in seismic exploration is getting more and more interesting especially in the determination of additional lithologic parameters, e.g. Vsub(p)/Vsub(s). Special field

techniques have been developed by the Compagnie Generale de Geophysique (CGG, Paris) using SS-waves and the combined interpretation of SS and PP waves. The given report demonstrates the observation of shear waves in routine seismic work by means of horizontal geophones. Possibilities for a most economic method of the registration of shear waves during routine seismic measurements should be given. As a result of the present research program field recordings and data processing have proven the possibility of recording and interpreting of converted waves (PS-waves) in connection with routine reflection seismic measurements. A special interpretation of the recorded converted waves results in the shear wave velocity and the Vsub(p)/Vsub(s) relation.

24487 **(CNEN-RT/AMB—82-1) Magnitude readings of the Lucano-Campano earthquakes of November 23, 1980 as recorded by accelerometers.** Fels, A. (Comitato Nazionale per l'Energia Nucleare, Rome (Italy)). Jan 1982. 13p. (In Italian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900868.

Portions are illegible in microfiche products.

Tabular data are presented on the magnitude of aforementioned earthquakes as determined by accelerogram readings recorded at various stations in Italy. Those readings are also illustrated.

24488 **(CNEN-RT/AMB—82-3) Observation of several large earthquakes with an eastern epicenter. The macroseismic region in Italy of the 1903 Greek earthquake.** Margottini, G. (Comitato Nazionale per l'Energia Nucleare, Rome (Italy)). Jan 1982. 104p. (In Italian). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83900859.

Portions are illegible in microfiche products.

A study is made of the seismicity of southern Italy, and in particular the characteristics of the August 11, 1903 earthquake in relation to the macroseismicity of east-central Mediterranean. Seismically active zones of Italy are mapped.

24489 **(LA—9679-PR) Earthquake catalog for northern New Mexico. Progress report, January-March 1982.** Cash, D.J.; Olsen, K.H.; McFarland, N.J.; Stewart, J.N.; Wolff, J.J. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 13p. NTIS, PC A02/MF A01. Order Number DE83009274.

This report is a summary of the earthquakes located in northern New Mexico by the Los Alamos National Laboratory seismic array. Data are presented in the form of tables and epicenter maps, with a brief explanatory text.

24490 **(LA-UR—83-117) Textural analysis of tephra from a rhyodacitic eruption sequence, Thira (Santorini), Greece.** Heiken, G. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 17p. (CONF-830409—2). NTIS, PC A02/MF A01. Order Number DE83006053.

From Workshop on characterization and quantification of surface features on clastic and pyroclastic particles; Tempe, AZ, USA (19 Apr 1983).

The Minoan eruption sequence of 1390 B.C. produced a minimum volume of 13 km^3 of rhyodacitic tephra (dense rock equivalent). The eruptions evolved from magmatic to phreatomagmatic and back to a mix of both processes. Thin section and scanning electron micrograph analysis of the tephra sequence provide information about eruption processes that is critical to interpretation of the field data. The eruptions began at a vent located above sea level and produced a coarse-grained Plinian pumice deposit. All later phases of the eruption involved propagating vent(s) into an older flooded caldera and flooding of the sea into a collapsing Minoan caldera. Interaction of magma and water produced fine-grained tephra that consist mostly of slightly curved, nearly flat shards and small pumice pyroclasts. These were derived during fragmentation of a heterogeneous, vesicular magma containing large compound vesicles and smaller, elongate vesicles. The vesiculated magma was thoroughly comminuted during magma-water interactions. The last eruptive phase is interpreted as having involved both magmatic and phreatomagmatic processes. Hot pyroclastic flows from this phase contained a bimodal mixture of pumice pyroclasts and finely comminuted shards.

24491 **(LA-UR—83-250) Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences.** Wohletz, K.H. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 35p. (CONF-830409—1). NTIS, PC A03/MF A01. Order Number DE83006074.

From Workshop on characterization and quantification of surface features on clastic and pyroclastic particles; Tempe, AZ, USA (19 Apr 1983).

Portions are illegible in microfiche products.

Hydrovolcanic pyroclasts are produced by the interaction of erupting magma with surface or near-surface water. Eruption energy determining pyroclast transport and depositional modes is dependent upon the amount of water interacting with magma. Grain morphologies, size distributions, surface textures, and chemical effects studied record the history of eruption cycles for volcanoes under consideration. Samples of crater-rim stratigraphic sequences from Crater Elegante and Cerro Colorado, Mexico, and from Panum Crater and Obsidian Dome, California, illustrate a basaltic tuff ring and tuff cone and two rhyolitic tuff rings respectively. Grain morphologies observed by scanning electron microscopy (SEM) reveal information on the process of melt fragmentation. Surface alteration and diagenesis have greater effect on pyroclasts from wet eruptions compared to dry ones. These textures are patchy overgrowths of microcrystalline and hydrated materials. Surface chemical characteristics observed with energy dispersive spectral analysis (EDS) show relative gains or losses of elements and an apparent enrichment of silica on altered surfaces.

24492 **(NUREG/CR—3145-Vol.1) Geophysical investigations of the Western Ohio-Indiana region. Annual report, October 1981-September 1982.** Christensen, D.H.; Wiedenbeck, M.G.; Jackson, P.L. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research). Feb 1983. 116p. NTIS, PC A06/MF A01 - GPO $5.50. Order Number DE83901400.

Portions are illegible in microfiche products.

Earthquake activity in the Western Ohio-Indiana region is monitored with a precision seismograph network: Nine stations clustered about Anna, Ohio, and four stations in Indiana centered about Indianapolis. During this period no earthquakes were detected in the region of the network. This seismic inactivity contrasts with the previous year, during which nine small (unfelt) earthquakes occurred within and adjacent to the Western Ohio portion of the network. Digital triggering and recording capability was added to the analog recording capability. Using the new digital capability, we were able to more precisely locate the focus of some of these small earthquakes. As part of the inception of a modeling investigation, a preliminary location of the Grenville Front was postulated as eastward of the network. Azimuthal changes in travel time residuals of teleseisms were used for this estimate.

24493 **(SAND—82-2373) BLOCKS: a block-motion code for geomechanics studies.** Taylor, L.M. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 58p. NTIS, PC A04/MF A01. Order Number DE83009221.

A block-motion code, BLOCKS, has been developed for use in geological investigations. In this model originally proposed by Cundall in 1971, jointed rock is treated as an assemblage of blocks. The equations of motion are solved for each block using an explicit integration operator. The displacements and rotations of each block and the resulting collisions with nearby blocks are calculated in the model. A complete theoretical description of the model is presented along with a detailed description of the computational algorithms used in the computer program. Several example problems are presented. A user's manual and complete documentation of the code are included.

24494 **(UCRL—15520) Analysis of seismic data at RSTN sites and high-frequency seismic signals at TFSO.** Der, Z.A.; Burnetti, J.A.; Marshall, M.E.; O'Donnell, A.; Gordon, E.; Wagner, R. (Teledyne Geotech, Alexandria, VA (USA)). Nov 1982. Contract W-7405-ENG-48. 328p. NTIS, PC A15/MF A01. Order Number DE83009328.

Portions are illegible in microfiche products.

In order to evaluate the operational effectiveness of stations located at Red Lake Ontario (RKON), Yellowknife (YKA), and Cumberland Plaueau Observatory (CPO) a wide range of signals and noise characteristics have been measured. In addition, the available literature has been reviewed to obtain more knowledge on the operational capabilities of these sites. Travel time delays and attenuation of short period telesciemic P and S waves indicate that the mantle under RKON and YKA exhibits the high velocity and high Q, and the travel times of short period P and S waves are late at CPO relative to RKON and YKA. Phase velocities of regional arrivals across the arrays at YKA and CPO are, in general, higher than the associated group velocities of the time windows chosen. The time domain characteristics and spectra of regional phases observed at the three sites indicates that regional phases crossing the tectonic, mountainous areas of western North America undergo a serious attenuation of their high frequency energy resulting in the low frequency character of the waves. On the other hand, regional phases crossing shield areas retain much of the high frequency energy. Aside from these changes in frequency content, no clear blockages of regional phases were found.

24495 **Sources of compass error in tunnel mapping.** Yow, J.L. Jr. (Univ of Mo, Kansas City, USA). *Bulletin of the Association of Engineering Geologists;* **19**: No. 2, 133-140(May 1982).

Six sets of compass measurements were performed in tunnels in igneous rock at the Nevada Test Site. The measurement sets were analyzed to evaluate the influences of wire mesh, rock bolts, mining equipment, and steel arches on compass-based geologic mapping work.

5803 Mineralogy, Petrology, And Rock Mechanics

REFER ALSO TO CITATION(S) 23060, 24491

24496 **(BMFT-FB-T—79-93) Further development of automatic measuring equipment for X-ray mineral analysis with computer.** Schliephake, R.W.; Pelz, W. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Feb 1979. 36p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750327.

An available automatic measuring equipment was further developed and the beam path was optimized. It allows a more advantageous measuring and a better intensity yield. A computer subroutine was established for the correct determination of the background even if it is bent and other a priori unknown interferences are neighboured. - This improved mineral analysis was tested by quantitative determination of carboniferous samples and their mineral matter after isolation by radio-frequency low-temperature ashing.

24497 **(DOE/BC/10215—23) Numerical modeling of massive hydraulic fractures. First annual report, September 1980-August 1981.** Palmer, I.D. (Oral Roberts Univ., Tulsa, OK (USA)). Apr 1983. Contract AS19-80BC10215. 73p. NTIS MF A01. Order Number DE83009168.

Microfiche only, copy does not permit paper copy reproduction.

Models of 3D fracture propagation are being developed to study the effect of variations of stress and rock properties on fracture shape and bottomhole pressure. Initially a blanket sand bounded by higher stress zones is considered, with stress and rock property contrasts symmetric about the payzone axis, and the fracture criterion is assumed to be K/sub i/ = K/sub c/, where K/sub i/ is stress intensity factor, and K/sub c/ the fracture toughness. First, quasi-static models are considered briefly, because they give information on fracture behavior in the limit that (μg) $\rightarrow$ 0. Second, viscous fluid flow effects have been considered in two different models, FL1 and FL2. Flow is along the payzone only, and leakoff is neglected. The net pressure at the tip, a, of the long axis required by the boundary condition K/sub i/ = K/sub c/ does not seem to be crucial in determining fracture height or bottomhole pressure. A parametric study has been conducted on effects of S_2-S_1, K/sub c/, and Young's modulus, E, on fracture shape and bottomhole pressure. It appears that K/sub c/ does not have as much effect as either E or S_2-S_1. Third, Model FL2, which represents better the vertical stress variation, shows the onset of a rapid growth in fracture height as S_2-S_1 is reduced. The onset of this divergence may be able to be used to give an upper or safe limit on the pumping parameters (μq) to ensure good containment, although the behavior is dependent on the form of the fluid flow equation used, and this must await confirmation. Fourth, when the stress contrast is too low, or if a fracture breaks ghrough a containing zone, or in a lenticular gas sand, the fracture length/height ratio may be so low that both a better width equation and a better fluid flow equation, which includes azimuthal flows, need to be incorporated. 13 figures, 4 tables.

24498 **(DOE/ER/10921—T1) Deep-burial diagenesis. Annual progress report, 1982-1983.** Friedman, G.M. (Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Geology). 1983. Contract AC02-81ER10921. 75p. NTIS, PC A04/MF A01. Order Number DE83009378.

Portions are illegible in microfiche products.

This program emphasizes the effects of deep burial on creation and elimination of porosity with depth and on changes in textures of carbonate rocks. Two parallel lines of investigation have been employed: (1) experimental compaction tests at various temperatures, pressures, and interstitial fluid compositions of natural carbonate sediments; and (2) petrographic and mechanical-log analysis of carbonate rocks from boreholes of some of the world's deepest carbonate hydrocarbon (gas) reservoirs. In compacted ooids in the presence of distilled water neomorphic microspar of calcite pseudomorphically replaced aragonite, with survival in places, in the ooids of parts of their original fabric. Most of the ooids, replaced neomorphically, retained concentric rims however. Ooids and skeletal particles compressed at 150, 200 and 250°C and at 1.5 and 2.4 kilobars, consistent with burial depth of 6 and 9 km showed appreciable volume reduction. Skeletal particles showed greater response to pressures than ooids and coarser particles lost more void space than finer ones. Except for crushed and split particles which increase at higher temperatures, other kinds of breakage are unrelated to temperature effects. Our study of boreholes reveals that among the world's deepest producing hydrocarbon (gas) reservoirs in the Anadarko Basin of Oklahoma porosity in carbonates is chiefly confined to dolomites.

24499 (EPRI-EA—2827, pp 5.1-5.29) **Mineralogy of the ILWAS lake-watering.** April, R.H. (Colgate Univ., Hamilton, NY). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

The mineralogy of the soil and unconsolidated glacial material in Woods, Panther and Sagamore Lake-watersheds was determined as part of the Integrated Lake-Watershed Acidification Study (ILWAS). A preliminary analysis of the mineralogical data is presented in this report. The main objectives of this work are to describe the mineralogic components of the lake-watersheds and determine the effects of rock-water interaction on acid precipitation and lake acidification.

24500 **(SAND—83-0474c) Time depdendent crack growth and failure in brittle rock.** Costin, L.S.; Mecholsky, J.J. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 25p. (CONF-830605—2). NTIS, PC A02/MF A01. Order Number DE83007940.

From 24. symposium on rock mechanics; College Station, TX, USA (20 Jun 1983).

Portions are illegible in microfiche products.

This paper reports the results of an experimental study aimed at relating the mechanism of stress corrosion crack growth to the time dependent failure of brittle rock. To this end, two types of experiments were performed. First, subcritical crack growth studies were performed to relate the velocity of crack growth to the applied stresses and environmental conditions (temperature and water content). Second, uniaxial compression tests were performed on the same rocks under the same environmental conditions. The compression tests were run over a range of strain rates in order to determine the ultimate failure stress as a function of strain rate. The results of the crack growth and compression tests were then analyzed

in terms of a recently developed model which relates the state of microcracking in a brittle material to the deformation and failure characteristics of the continuum. The model was used to predict the results of the uniaxial compression tests based on input provided from the crack growth tests. Comparison of model predictions and experimental results is discussed in some detail.

5804 Geochemistry

REFER ALSO TO CITATION(S) 23096, 24256, 24283

24501 (EPRI-EA—2827, pp 6.1-6.17) **Lysimeter and soil chemistry studies.** Cronan, C.S. (Maine Univ., Orono). Jan 1983. NTIS, PC A14/MF A01. Order Number DE83901460.

From Integrated lake-watershed acidification annual review conference; Sagamore Lake, NY, USA (8 Oct 1980).

Portions are illegible in microfiche products.

During the course of the Integrated Lake-Watershed Acidification Study (ILWAS), the Terrestrial Team has focused its efforts toward addressing the following central question: Are there important differences in terrestrial ecosystem properties or processes which help to explain the different responses to acid precipitation exhibited by the Woods, Sagamore, and Panther lake-watershed systems. This general question has been approached with a number of specific hypotheses and methodologies by an interdisciplinary team of scientists from Cornell University, Smith College, Colgate University, Dartmouth College-University of Maine, the US Geological Survey, and Tetra Tech, Inc. In the brief report which follows, the highlights of the Dartmouth College-University of Maine at Orono research efforts are presented. The work includes soil solution chemistry, soil chemistry, and organic geochemistry in the three lake-watershed systems.

5805 Oceanography

24502 (DOE/EV/00902—34) **Continental Shelf processes affecting the oceanography of the South Atlantic Bight. Progress report, June 1978-November 1981.** Pietrafesa, L.J. (comp.). (North Carolina State Univ., Raleigh (USA)). Nov 1981. Contract AS09-76EV00902. 424p. NTIS, PC A18. Order Number DE82010798.

Paper copy only, copy does not permit microfiche production.

Progress is reported on continental margin oceanographic studies being conducted as part of the DOE South Atlantic Bight program. The program is working towards a fundamental understanding of oceanographic processes which determine the transport pathways, residence times, and ultimate fate of biological and chemical parameters in the coastal environment. (ACR)

24503 (EEC—134) **Halo-thermal simulation of the Dead Sea.** Vadasz, P.; Weiner, D.; Zvirin, Y. (Israel Electric Corp. Ltd., Haifa; Technion-Israel Inst. of Tech., Haifa. Faculty of Mechanical Engineering). Dec 1982. 42p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901475.

A one-dimensional numerical model is developed to predict the long-range variations of vertical temperature, density, and salinity profiles in the Dead Sea which is a highly saline large water body. The model utilizes the continuity, momentum, energy-and-mass-transfer equations while taking into account the influence of the wind. The partial-differential equations were solved numerically by means of explicit finite-differences method. Simulation results were verified by comparison to measured data. In addition, the algorithm evaluates the evaporation rate from the Dead Sea, which is an important parameter in several engineering projects under planning.

64 PHYSICS RESEARCH

6401 Astrophysics And Cosmology

24504 (IC—80/98) **Penrose process of energy extraction in electrodyamics.** Dadhich, N. (International Centre for Theoretical Physics, Trieste (Italy)). Jul 1980. 12p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700734.

We consider here the Penrose process of energy extraction from a massive stationary charge by throwing in particles (including tachyons) of suitable parameters in electrodynamics.

24505 (IC—80/100) **Do neutron stars disprove multiplicative creation in Dirac's large number hypothesis.** Qadir, A.; Mufti, A.A. (International Centre for Theoretical Physics, Trieste (Italy)). Jul 1980. 10p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700732.

Dirac's cosmology, based on his large number hypothesis, took the gravitational coupling to be decreasing with time and matter to be created as the square of time. Since the effects predicted by Dirac's theory are very small, it is difficult to find a "clean" test for it. Here we show that the observed radiation from pulsars is inconsistent with Dirac's multiplicative creation model, in which the matter created is proportional to the density of matter already present. Of course, this discussion makes no comment on the "additive creation" model, or on the revised version of Dirac's theory.

24506 (IC—80/130) **Dirac's large number hypothesis and the red shifts of distant galaxies.** Qadir, A. (International Centre for Theoretical Physics, Trieste (Italy)). Aug 1980. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700733.

Dirac has postulated that all large dimensionless numbers occurring in Nature must be inter-related. On this basis he suggested that the gravitational coupling decreases linearly with time (as measured by atomic clocks) while the number of nucleons in the observable Universe increases quadratically with time. It has already been demonstrated that one of the three possible modes for Dirac's theory to work, the "multiplicative creation" mode, is not compatible with the observations of pulsars. Here we demonstrate that the other mode of creation of matter also faces severe problems, and we suggest that the comparison of red shifted galaxies could provide a comparatively "clean" test of Dirac's theory.

24507 **Gamma-line astronomy.** Woosley, S.E.; Axelrod, T.S.; Weaver, T.A. (Lawrence Livermore National Lab., CA). *Comments on Nuclear and Particle Physics;* 9: No. 6, 185-197(1981). Contract W-7405-ENG-48.

Explosive events in stars, especially supernovae, are expected to produce substantial quantities of short-lived radioactive isotopes as a part of the ongoing synthesis of heavy elements in the galaxy. Theoretically, the fluxes of γ rays produced by the decay of these distant nuclei should be detectable by experiments planned for the next decade. Observation of these signals will provide unique information regarding the ongoing chemical evolution of the galaxy and the nature of supernovae.

6402 Atmospheric Physics

24508 (LA—9636-MS) **Computer model of chemistry and dynamics of the mesosphere, thermosphere, and ionosphere.** Sutherland, C.D.; Zinn, J. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 49p. NTIS, PC A03/MF A01. Order Number DE83008358.

This report describes a computer model of the mesosphere, thermosphere, and ionosphere and compares computed results with experimental data on the diurnal variations of that system under normal ambient and magnetically disturbed conditions. The model includes the effects of time-varying thermospheric winds and E fields, electron, ion and neutral temperatures, solar and geomagnetic activity, eddy diffusion, and molecular diffusion. The computer model is designed to be two-dimensional for application to prob-

lems of F-layer depletions due to rocket exhaust products. This report describes one-dimensional results and comparisons with data on the natural ionosphere at the time of the Skylab I launch in May 1973.

24509 **(NASA-CR—168648) Theory of the auroral magnetosphere.** Schulz, M.; Chiu, Y.T.; Cornwall, J.M. (Aerospace Corp., El Segundo, CA (USA)). Sep 1981. 7p. NTIS, PC A02/MF A01.

The aurora has come to be understood as a manifestation of energy transfer and plasma transfer from the solar wind to the magnetosphere. The auroral oval seems to be a mapping of the boundary layer that lies just inside the magnetospheric surface, which consists of the magnetopause and neutral sheet. The auroral oval is consequently a region of reversal for the meridional (r,8) component of the magnetospheric convection electric field and thus a region of strong shear in the plasma drift velocity field. The velocity shear seems to account for the formation of eddies in the auroral curtain . Moreover, the Kinematical impedance associated with hot auroral plasma perpendicular electric field across a narrow region of latitude to occur without the formation of a large parallel electric field. The signature of the parallel electric field is such as to produce upgoing ion beams and precipitating electron beams in the PM (afternoon-evening) sector of local time, and to account for the polarity of Region-1 currents as a function of local time.

6403 Atomic, Molecular, And Chemical Physics

24510 **(ANL/NESC—786) CONDYN; Polya model secondary electron spectra.** Dietz, L.A.; Sheffield, J.C. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048786.

A maximum of 6 parameters can be fitted.

The CONDYN program fits a Polya (negative binomial) frequency distribution to an observed secondary electron spectrum. Secondary-electron yields measured by a spectrometer are fit to the Polya statistical model by a nonlinear least squares technique. There are two basic assumptions in the Polya model: (1) the mean secondary-electron yield from each small, thin element of surface area of an ion-converter dynode follows a Poisson distribution, and (2) the frequency of these mean yields follows a gamma distribution.CDC6600,7600; FORTRAN IV; SCOPE 3.4 (CDC6600), SCOPE 2.1 (CDC7600); 16K (octal) words of memory.

24511 **(ANL/NESC—954) ABCD; atom-triatom nonreactive collisions.** Schatz, G.C. (Northwestern Univ., Evanston, IL (USA). Dept. of Chemistry). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048954.

The intramolecular potential is assumed to be a quartic force field. Reactive or dissociative collisions are not properly described. Only processes for which the rotational sudden approximation is valid are appropriate. The molecule must be symmetric, but can be either linear or nonlinear. Final molecular eigenstates must have less than 10 quanta of excitation in each mode.

ABCD integrates trajectories simulating nonreactive collisions between an atom and a triatomic molecule, and calculates quasiclassical integral and differential cross sections for vibrationally inelastic scattering using a rotational sudden approximation. Both the intermolecular and the intramolecular potentials must be supplied.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 36,000 (octal) words of memory are required for execution on the CDC7600; 41,000 (octal) words are needed on the CDC CYBER175..

24512 **(ANL/NESC—955) ABCRR;ABCRRJ; A+BC classical trajectory study.** Thomas, L.D. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048955.

ABCRR computes classical trajectories for rotationally inelastic collisions between an atom, A, and a diatomic molecule, BC, and for each trajectory stores initial and final trajectory data which can be used to compute differential, total differential, and integral cross sections. The program prints one line of information at the end of each trajectory and, optionally, prints data for intermediate points along the trajectory. ABCRRJ computes classical trajectories for A-BC collisions with fixed total angular momentum rather than fixed impact parameter. Data for each trajectory are stored which can be used to compute partial and integral cross sections. Classical partial cross sections for a fixed total angular momentum, J, can be computed, which facilitate a direct comparison of quantum and classical partial cross sections when the initial state is not the ground rotational state.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); Both ABCRR and ABCRRJ require less than 24,000 (octal) words of memory. The auxiliary programs, XRR and XRRJ, require 32,000 (octal) and 67,000 (octal) words of memory, respectively..

24513 **(ANL/NESC—966) VIVAS2; A-BC exact coupled channel scattering.** Parker, G.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048966.

Maxima of - 600 quantum states for the system 300 rotational J values 150 channels to be integrated 50 oscillator basis functions 50 vibrational states The S-matrix analysis assumes that there are no coulomb interactions.

VIVAS2 computes the scattering S-matrix and transition probabilities for the collision of an S-state atom, A, with a sigma-state diatomic molecule, BC.DEC VAX11/780; FORTRAN 77; VMS 2.4; 2.9 megabytes of memory are required to execute the sample problems..

24514 **(CONF-810109—2) Optical observations of molecular dissociation in thin foils.** Berry, H.G.; Gay, T.J.; Brooks, R.L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83008740.

From Bat-Sheva seminar on molecular ions, molecular structure and interaction with matter; Rehovot, Israel (4 Jan 1981).

Portions are illegible in microfiche products.

We have measured the intensity and polarizations of light emitted from atomic excited states of dissociated molecular ions. Using HeH^+ projectiles, we have observed factors of 1 to 5 enhancements of the light from n=3, $^{1\,3}$P,D states of He I and some He II and H I emissions. Observations of Lyman-α emission after dissociation of H_3^+ and H_5^+ show rapid variations in light yield for small internuclear separations at the foil surface.

24515 **(CONF-810109—3) UV-laser photofragmentation of a 2-MeV H_2i beam.** Cue, N.; Edwards, A.K.; Gemmell, D.S.; Kanter, E.P.; Kutina, R. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83008741.

From Bat-Sheva seminar on molecular ions, molecular structure and interaction with matter; Rehovot, Israel (4 Jan 1981).

Portions are illegible in microfiche products.

A 2-Mev beam of H_3^+ molecular ions was excited by 193-nm photons from an ArF laser. The H^+ photofragments were energy-analyzed by an electrostatic analyzer and the potential energy released in the H_3^+ rest frame was determined. The released energy corresponds to absorption from low-lying vibrational levels of the ls σ/sub g/ ground state to the 2p σ/sub u/ state of H_2^+.

24516 **(CONF-810109—4) Using an electrostatic accelerator to determine the stereochemical structures of molecular ions.** Gemmell, D.S. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 26p. NTIS, PC A03/MF A01. Order Number DE83008742.

From Bat-Sheva seminar on molecular ions, molecular structure and interaction with matter; Rehovot, Israel (4 Jan 1981).

Portions are illegible in microfiche products.

Traditional experimental techniques (e.g., studies on photon absorption or emission) for determining the stereochemical struc-

tures of neutral molecules are extremely difficult to apply to molecular ions because of problems in obtaining a sufficient spatial density of the ions to be studied. Recent high-resolution measurements on the energy and angle distributions of the fragments produced when fast (MeV) molecular-ion beams from an electrostatic accelerator dissociate in thin foils and in gases, offer promising possibilities for deducing the stereochemical structures of the molecular ions constituting the incident beams. In this paper we describe this Coulomb explosion technique and give some examples of its use in structure determinations.

24517 (CONF-810432—5) Beam-foil spectroscopy at Argonne National Laboratory. Berry, H.G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83007795.

From Atomic physic program contractors' workshop; Argonne, IL, USA (1 Apr 1981).

We have completed a set of precision wavelength measurements of the transitions $1s2s^3S_1$ - $1s2p^3P_0$,$_2$ of the helium-like ions of silicon, sulfur, and chlorine. We have calculated the wavelengths of these transitions for Z = 2-50 using a nonrelativisitc 1/Z expansion, one-electron Dirac energies, plus relativistic corrections in first-order perturbation theory, plus one-electron QED or Lamb-shift corrections. By comparisons of measurements of Z = 4-26 and theory, we find a discrepancy which is approximately 0.015 Z^3 cm^{-1}. We have shown that this arises from a first-order screening correction to the one-electron Lamb shift and we have obtained an ab initio estimate of the correction.

24518 (CONF-810868—6) Hyperfine structures of the nd ^{1}D(n = 3 - 8) states of ^{3}He I. Brooks, R.L.; Streif, V.F.; Berry, H.G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83007931.

From 6. international conference on fast ion beam spectroscopy; Quebec, Canada (17 Aug 1981).

Portions are illegible in microfiche products.

We have used the beam-foil quantum beat method to measure the hyperfine structure separations F = 3/2 - 5/2 of the 1snd ^{1}D states (n = 3 - 8) of ^{3}He I. We observed the single frequency modulated decay curves of the $1s2p\ ^1P$ - 1snd ^{1}D transitions for times after excitation up to 50 ns, corresponding to 4 to 5 modulation periods. The frequencies obtained (with a precision of 2 to 5%) are compared with other experiments and theory. The frequencies are determined mainly by the singlet-triplet energy separations and mixing factors for the He I D-states. The results agree with the same parameters obtained from other recent level-crossing measurements in strong magnetic field mixing of the singlet-triplet states.

24519 (CONF-820883—3) Effects of resonances in molecular photoionization measured with triply differential photoelectron spectroscopy. Parr, A.C.; Holland, D.M.P.; Ederer, D.L.; Dehmer, J.L. (National Bureau of Standards, Washington, DC (USA). Synchrotron Ultraviolet Radiation Facility; Maryland Univ., College Park (USA); Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83008648.

From 9. international mass spectrometry conference; Vienna, Austria (29 Aug 1982).

Portions are illegible in microfiche products.

A variable wavelength angle resolving photoelectron spectrometer has been used to study the effects of autoionization and shape resonances upon molecular photoionization. Such resonance phenomena produce non-Franck-Condon effects in the vibrational intensity distributions and significant variations in the asymmetry parameters. Results are presented for C_2N_2 and CO_2. Constant Photoelectron Energy (CPE) spectroscopy has been performed on C_2H_2 and spectra are shown at four kinetic energies. The information concerning energy absorption in molecules gained from these studies is discussed.

24520 (CONF-8103163—2) Molecular-dynamics study of 2-D melting: long-range potentials. Kalia, R.K.; Vashishta, P. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008629.

From NATO Advanced Institute conference on non-linear phenomena and phase transitions; Geilo, Norway (29 Mar 1981).

Melting of a two-dimensional electron lattice and a two-dimensional dipolar solid are studied using molecular-dynamics techniques. The existence of hysteresis and latent heat of melting are observed, and the melting transitions in the two cases are found to be first order. For an electron lattice the melting occurs between Γ=129 +- 3 whereas in the dipolar solid it is between Γ=62 +- 3, with a transition entropy of 0.3 k/sub B/ per particle for both the systems.

24521 (CONF-8209101—3) Static-mode laser-fluorescence spectroscopy: a new technique for studying excitation mechanisms in particle-surface collisions. Gruen, D.M.; Pellin, M.J.; Young, C.E.; Mendelsohn, M.H. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 2p. NTIS, PC A02/MF A01. Order Number DE83007709.

From Inelastic ion, surface collision conference; Middlefart, Denmark (21 Sep 1982).

The recent development of static mode laser fluorescence spectroscopy provides a new technique for measuring the hitherto inaccessible distributions among low lying excited electronic energy levels at well defined surface oxygen coverages. Because of the sensitivity and selectivity of the LFS method, it is now possible to probe the effects on excitation coefficients of oxygen coverages at monolayer levels using simultaneous Auger measurements which in turn can be correlated with specific adsorbate structures based on LEED, ISS and ELS studies. The results of such measurements are discussed and evaluated in the light of current theoretical models. Excited state distributions determined by LFS on low lying manifolds are now available on a variety of systems (e.g., Ti, Fe, Zr, U) and point to much lower temperatures, 0.01-0.1 eV, for the low lying states compared to 0.5-1 eV for the SCANIIR and excited ion state levels. Recent work on the effect of monolayer oxygen coverages on Ti metal using static mode LFS is rviewed and detailed correlations made between excited state populations and specific oxygen bonding states to the metal surface.

24522 (DOE/ER/02640—14) Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982. Gentry, W.R. (Minnesota Univ., Minneapolis (USA)). Dec 1982. Contract AC02-76ER02640. 78p. NTIS, PC A05/MF A01. Order Number DE83009371.

Portions are illegible in microfiche products.

In order to investigate the dynamics of reactions between two reactants having open-shell electronic configurations, a comprehensive experimental and theoretical study was made of the reactions $H_3^+ + X \rightarrow XH^+ + H$, in which X is a first-row atom. None of these reactions had ever before been observed. The merged molecular beam technique was used to measure the energy dependence of the microscopic reaction cross sections over the range of relative kinetic energies from 0.002 eV to 30 eV, with an absolute accuracy of typically 5%. Detailed information on the reaction dynamics and energetics was also obtained by high-resolution energy analysis of the product ions. the theoretical interpretation of the low-energy reaction cross sections was based on long-range interaction potentials calculated for the charge-quadrupole and charge-induced dipole contributions, which are sensitive to the projection quantum numbers for the electronic angular momentum of the atom. The powerful combination of experimental and theoretical techniques permitted the separate reaction probabilities per capture collision to be deduced for Σ and Pi states of the reactants, and made possible the clarification of the role which electronic nonadiabaticity plays in the reactions of two free radicals. In the last stage of this project, attention was turned to the study of state-to-state molecular energy transfer using a noval pulsed molecular beam instrument with laser detection of scattered products.

24523 (DOE/EV/04703—37) Anomalous electron-attachment properties of perfluoropropylene (1-C_3F_6) and their effect on the breakdown strength of this gas. Hunter, S.R.; Christophorou, L.G.; McCorkle, D.L.; Sauers, I.; Ellis, H.W.; James, D.R. (Oak Ridge National Lab., TN (USA)). 1982. Contract AS05-76EV04703. 15p. (ORO—4703-37). NTIS, PC A02/MF A01. Order Number DE83008777.

Electron attachment to perfluoropropylene (1-C_3F_6) in 1-C_3F_6/buffer gas mixtures has been found to be anomalously dependent on both the 1-C_3F_6 and buffer gas pressures, as well as on the gas temperature. We have found also that the uniform field breakdown strength of pure 1-C_3F_6 is dependent on gas pressure but not on the gas temperature. A mass spectrometer study of the negative ions formed in a moderately high pressure corona discharge has been made, and the principal negative ions formed by electron attachment to 1-C_3F_6 have been identified. Based on these studies, a reaction scheme for electron attachment to 1-C_3F_6 is proposed which results in stable negative ion clusters but does not involve pre-existing dimers. Further, we propose that the observed pressure dependence in the breakdown strength of this gas is due to the large pressure dependence of the electron attachment process we observed.

24524 **(DOE/EV/04703—38) Electron-attachment processes.** Christophorou, L.G.; McCorkle, D.L.; Christodoulides, A.A. (Tennessee Univ., Knoxville (USA). Dept. of Physics; Oak Ridge National Lab., TN (USA)). 1982. Contract AS05-76EV04703. 229p. (ORO—4703-38). NTIS, PC A11/MF A01. Order Number DE83008780.

Portions are illegible in microfiche products.

Topics covered include: (1) modes of production of negative ions, (2) techniques for the study of electron attachment processes, (3) dissociative electron attachment to ground-state molecules, (4) dissociative electron attachment to hot molecules (effects of temperature on dissociative electron attachment), (5) molecular parent negative ions, and (6) negative ions formed by ion-pair processes and by collisions of molecules with ground state and Rydberg atoms.

24525 **(DOE/EV/04703—39) Electron affinities of atoms, molecules, and radicals.** Christodoulides, A.A.; McCorkle, D.L.; Christophorou, L.G. (Tennessee Univ., Knoxville (USA). Dept. of Physics). 1982. Contract AS05-76EV04703. 300p. (ORO—4703-39). NTIS, PC A13/MF A01. Order Number DE83008779.

Portions are illegible in microfiche products.

We review briefly but comprehensively the theoretical, semiempirical and experimental methods employed to determine electron affinities (EAs) of atoms, molecules and radicals, and summarize the EA data obtained by these methods. The detailed processes underlying the principles of the experimental methods are discussed very briefly. It is, nonetheless, instructive to recapitulate the definition of EA and those of the related quantities, namely, the vertical detachment energy, VDE, and the vertical attachment energy, VAE. The EA of an atom is defined as the difference in total energy between the ground state of the neutral atom (plus the electron at rest at infinity) and its negative ion. The EA of a molecule is defined as the difference in energy between the neutral molecule plus an electron at rest at infinity and the molecular negative ion when both, the neutral molecules and the negative ion, are in their ground electronic, vibrational and rotational states. The VDE is defined as the minimum energy required to eject the electron from the negative ion (in its ground electronic and nuclear state) without changing the internuclear separation; since the vertical transition may leave the neutral molecule in an excited vibrational/rotational state, the VDE, although the same as the EA for atoms is, in general, different (larger than), from the EA for molecules. Similarly, the VAE is defined as the difference in energy between the neutral molecule in its ground electronic, vibrational and rotational states plus an electron at rest at infinity and the molecular negative ion formed by addition of an electron to the neutral molecule without allowing a change in the intermolecular separation of the constituent nuclei; it is a quantity appropriate to those cases where the lowest negative ion state lies above the ground states of the neutral species and is less or equal to EA.

24526 **(DOE/EV/04703—40) Interaction of slow electrons with high-pressure gases ('Quasi-liquids'): synthesis of our knowledge on slow electron-molecule interactions. Progress report.** McCorkle, D.L.; Christophorou, L.G. (Tennessee Univ., Knoxville (USA). Dept. of Physics and Astronomy). 1983. Contract AS05-76EV04703. 7p. NTIS, PC A02/MF A01. Order Number DE83008778.

Research is briefly summarized in the areas of: (1) electron affinities of atoms, molecules and radicals, (2) electron attachment processes, and (3) tagging materials for detection of explosives.

24527 **(DOE/RA/10722—3) Laser photoelectron spectroscopy of ions. Progress report, August 1, 1982-July 31, 1983.** Ellison, G.B. (Colorado Univ., Boulder (USA). Dept. of Chemistry). Mar 1983. Contract AC02-80ER10722. 20p. NTIS, PC A02/MF A01. Order Number DE83009584.

Portions are illegible in microfiche products.

We have undertaken a program which measures the photoelectron spectra of negative-ion beams. This experiment has afforded us direct information about these ions and the corresponding neutral radicals. Several ions and numerous radicals are believed to be crucial intermediates in combustion processes and flame chemistry. We have fabricated a spectrometer which directly measures electron affinities (EA). Knowledge of the EA and gas-phase acidity of a radical has enabled us to deduce several radical heats of formation and bond strengths.

24528 (HMI—373, pp 29) **Differential cross section for electron capture in fast ion-atom collisions.** Ho, T.S.; Eichler, J.; Lieber, M.; Chan, F.T. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24529 (HMI—373, pp 30-31) **Second Born calculation for electron capture.** McGuire, J.H.; Eichler, J.; Simony, P.R. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24530 (HMI—373, pp 32-33) **Electron capture in ion-atom collisions at intermediate collision energies.** Fritsch, W.; Lin, C.D. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24531 (HMI—373, pp 34) **Molecular binding effects in electron capture in $Li^+ + H$ collisions.** Fritsch, W.; Lin, C.D. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24532 (HMI—373, pp 35) **Molecular dipole deformation as a collective variable in slow atomic collisions.** Eichler, J.; Ho, T.S. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24533 (HMI—373, pp 36) **Analytic form factors for Coulomb ionization.** Wille, U. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24534 (HMI—373, pp 36) **L-K vacancy sharing in Ar + Kr collisions.** Fritsch, W.; Wille, U.; McMurray, R.; Reenan, M.J.; Lutz, H.O. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24535 (HMI—373, pp 37) **Impact-parameter dependence of M-shell excitation in slow Xe + Xe collisions.** Wille, U.; Shanker, R.; Hippler, R.; Lutz, H.O. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24536 (HMI—373, pp 38-39) **Rotationally induced L-shell excitation in energetic Ag + Ag and Ag + Cs collisions.** Wille, U.; Presser, G.; Staehler, J. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24537 (HMI—373, pp 114-115) **Charge distributions of recoil ions.** Werner, H.C.; Schmidt-Boecking, H.; Nolte, G.; Stolterfoht, N.; Schneider, D. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24538 (HMI—373, pp 116) **Charge state determination of fast ions in solids using radiative electron capture (REC).** Nolte, G.; Janke, M.; Schmidt-Boecking, H.; Schneider, D. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24539 (HMI—373, pp 117) **Investigation of the asymmetry of the charge transfer into continuum in collisions of 155 MeV Ne^{10+} in He.** Berry, S.; Elston, S.; Breining, M.; Sellin, I.A.; Schiwietz, G.; Nolte, G.; Schmidt-Boecking, H.; Stolterfoht, N. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24540 (HMI—373, pp 118) **L-shell excitation of Si and Ar in collisions of 35 to 400 keV Si^+ on Ar.** Schneider, D.; Stolterfoht, N.; Wille, U.; Nolte, G. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24541 (HMI—373, pp 119) **Calculation of KL-vacancy sharing in asymmetric ion-atom collisions.** Stolterfoht, N. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24542 (HMI—373, pp 120) **Electron capture into Rydberg states of fast ion beams following gas and foil excitation.** Vager, Z.; Schneider, D.; Kanter, E.; Gemell, D.; Zabranzky, B. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24543 (HMI—373, pp 121-122) **Observation of the recoil effect on the K-shell excitation probabilities in ion-atom collisions.** Gruber, G.; Bethge, K.; Kelbch, S.; Loechter, N.; Schadt, W.; Stiebing, K.E.; Schmidt-Boecking, H.; Schuch, R.; Roesel, F. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24544 (HMI—373, pp 123-124) **Target thickness and density effects for inner shell excitation in near symmetric collision-systems.** Hoffmann, R.; Mueller, K.; Pflanz, E.; Schmidt-Boecking, H.; Schuch, R. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24545 (LA—9582-C) **Proceedings of the workshop on muon science and facilities at Los Alamos.** Heffner, R.H. (comp.). (Rice Univ., Houston, TX (USA); Los Alamos National Lab., NM (USA)). Nov 1982. Contract W-7405-ENG-36. 126p. (CONF-8203119—). NTIS, PC A07/MF A01. Order Number DE83004473.
From Workshop on muon science and facilities at Los Alamos; Los Alamos, NM, USA (15 Mar 1982).
Portions are illegible in microfiche products. Original copy available until stock is exhausted.
This report contains the proceedings of a workshop held at Los Alamos March 15-18, 1982 to consider present and future experiments with muons in particle, nuclear and solid-state physics, and in chemistry. The impact of possible new muon channels was given special attention. The participants concluded that new facilities, particularly with low-momentum and pulse capabilities, would have major benefits in all areas considered.

24546 (UCID—19741) **Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets.** Slaughter, D.R. (Lawrence Livermore National Lab., CA (USA)). 24 Feb 1983. Contract W-7405-ENG-48. 28p. NTIS, PC A03/MF A01. Order Number DE83009174.
Coupled electron-photon transport calculations have been carried out to simulate the photon generation when a 5- or 50-MeV electron beam strikes a solid or gas target. Results indicate that a 5-MeV beam striking targets of tungsten wire, air, or air doped with Kr or Xe generates a photon spectrum sharply peaked in the forward direction and with approximately 1/E spectral intensity. At right angles to the beam the photon intensity is predominantly due to characteristic K x-rays. A 50-MeV beam striking the same targets generates substantially higher photon yield in the forward direction, but the yield normal to the beam is similar to that due to the 5-MeV beam. However, positron-electron annihilation radiation constitutes a significant part of the photon radiation normal to the beam, and is more intense than characteristic K x-rays when the target is more than about one-third of the electron range.

24547 **Optoacoustic measurements of IR multiphoton excitation of cis-3, 4-dichlorocyclobutene.** Presser, N.; Barker, J.R.; Gordon, R.J. (Department of Chemistry, University of Illinois at Chicago, Chicago, Illinois 60680). *Journal of Chemical Physics;* **78**: No. 5, 2163-2169(1 Mar 1983).
Optoacoustic detection was used to study the infrared multiphoton excitation of cis-3,4-dichlorocyclobutene (DCCB). The dependence of the optoacoustic signal S/sub OA/ on DCCB pressure P/sub DCCB/, on Ar buffer gas pressure P/sub Ar/, and on laser fluence phi were studied systematically. It was observed that S/sub OA/ is proportional to P/sub DCCB/ and increases monotonically with P/sub Ar/, leveling off at P/sub Ar/~10 Torr. Absolute calibration of S/sub OA/ was achieved by measuring the attenuation of the laser beam. It was found that the average number of photons absorbed by DCCB n-bar varies as 5.4 phi/sup 0.85/, where phi is expressed in J/cm^2. It is shown that the buffer gas pressure dependence of S/sub OA/ can be used to deduce the vibrational relaxation rate of the excited molecule. The fluence dependence of n-bar is predicted quantitatively by numerical solution of the master equation, including collision terms. It is assumed in this calculation that the infrared absorption cross section is independent of vibrational energy and is equal to the nominal small signal cross section.

24548 **A $^4u^-$—X ^{3}Pi transition in CF: A measurement of the term energy and bond length of a fluoromethylidyne metastable.** Grieman, F.J.; Droege, A.T.; Engelking, P.C. (Department of Chemistry, Chemical Physics Institute, University of Oregon, Eugene, Oregon 97403). *Journal of Chemical Physics;* **78**: No. 5, 2248-2253(1 Mar 1983).
We report the first observation of the (0,0) and (0,1) vibrational bands of the weak, spin forbidden a $^4\Sigma^-$—X ^{3}Pi transition of the CF radical. The spectra, obtained in a flowing afterglow, yield values for T_e, B_e, and r_0 of the a $^4\Sigma^-$ state of 28 564 +- 1 cm^{-1}, 1.3035 +- 0.002 cm^{-1}, and 1.326 +- 0.001 A, respectively. The intensity distribution in the rotational subbands is consistent with the mixing of the a $^4\Sigma^-$ state predominantly with the X ^{3}Pi state and

the uncharacterized C $^2\Sigma^+$. This result is discussed with regard to previous calculations.

24549 **Multichannel distorted wave Born approximation for reactive scattering.** Hubbard, L.M.; Shi, S.; Miller, W.H. (Department of Chemistry and Materials and Molecular Research Division of Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Journal of Chemical Physics;* **78**: No. 5, 2381-2387(1 Mar 1983).

Previous applications of the distorted wave Born approximation (DWBA) to reactive scattering have often given reasonably good relative cross sections, i.e., angular distributions, product state distributions, etc.: but absolute reactive cross sections have been poor. It is argued in this paper, however, that the DWBA for reactive scattering should be accurate if (1) the reaction probability is sufficiently small (as it is, e.g., in the threshold region of a reaction) and (2) the nonreactive scattering is described sufficiently accurately. To describe the nonreactive scattering "sufficiently accurately" this paper utilizes a nonreactive coupled-channel scattering wave function for distorted waves in the DWBA. Application to a standard test problem (collinear $H+H_2$) shows this multichannel DWBA indeed to be extremely accurate if the reaction probability is no larger than 0.1 and if ~3 to 4 vibrational states are included in the nonreactive coupled-channel expansion. This approach thus provides an excellent description of the threshold region of a reaction which has an activation barrier.

24550 **Third body efficiencies for collision-induced dissociation of diatomics. Rate coefficients for $H+H_2 \rightarrow 3H$.** Blais, N.C.; Truhlar, D.G. (Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* **78**: No. 5, 2388-2393(1 Mar 1983).

Fixed-energy cross sections, thermal-translation rate constants, energies of activation, opacity functions, and probabilities of reaction as functions of initial relative orientation angle are presented for the reaction $H+H_2(v, j) \rightarrow 3H$ on the lowest-energy potential surface for selected initial vibrational-rotational states (v, j) of H_2. In agreement with the experimental result for steady dissociation of a thermal mixture of initial states, the collision-induced dissociation process for these state-selected processes is found to be considerably enhanced for H as collision partner as compared to Ar as collision partner. We find that the cross sections for collision-induced dissociation are strongly increasing functions of initial internal energy and initial vibrational quantum number. The general trend at 4500 K is that the rate constants increase more rapidly than the equilibrium populations decreases as we increase v. The activation energies for complete dissociation are larger than the fixed-state binding energies by 0.2—1.1 eV.

24551 **Electronic excited state transport among molecules distributed randomly in a finite volume.** Ediger, M.D.; Fayer, M.D. (Department of Chemistry, Stanford University, Stanford, California 94305). *Journal of Chemical Physics;* **78**: No. 5, 2518-2524(1 Mar 1983).

A theoretical study of electronic excited state transport among molecules randomly distributed in a finite volume is carried out. Two special cases of the general transport and trapping problem are treated. A truncated series expansion in powers in the chromophore density is used as an approximation for one component systems (i.e., donor—donor transport only). In two component systems of donors and traps, the Foerster limit, in which transfer can occur only from donors to traps due to low donor concentrations, is solved exactly for a finite spherical volume. In both cases, the results presented demonstrate that time-dependent observables can be significantly altered in finite volume systems relative to infinite volume systems. These calculations have implications for the interpretation of experiments performed on real finite volume systems, e.g., energy transport among the chromophores of an isolated polymer chain.

24552 **Local mode predictions for excited stretching vibrational states of HCCD and H ^{12}C ^{13}CH.** Halonen, L.; Noid, D.W.; Child, M. (Theoretical Chemistry Department, University of Oxford, 1 South Parks Road, Oxford OX1 3TG, United Kingdom). *Journal of Chemical Physics;* **78**: No. 5, 2803-2804(1 Mar 1983).

Calculation are performed for the stretching vibrational states of acetylene HCCD and $H^{12}C^{13}H$ on the Oak Ridge computing systems. The results of these calculations agree with the recent observations by photo-acoustic spectroscopy. (AIP)

24553 **Radiative charge transfer in collisions of He^{2+} ions and ground-state H atoms.** West, B.W.; Lane, N.F.; Cohen, J.S. (Physics Department, Rice University, Houston, Texas 77251). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 6, 3164-3169(Dec 1982).

Total cross sections for radiative charge transfer in collisions of $^4He^{2+}$ ions with ground-state H atoms leading to He^+ 1s and H^+ ions have been calculated for a range of center-of-mass energies from 0.1 to 1000 eV. An adiabatic optical-potential formalism is used where the imaginary part of the potential-energy function is proportional to the Einstein A coefficient for the molecular transition. Both quantum-mechanical and semiclassical JWKB calculations are performed. Predissociation resonances add structure to the cross section. The radiative contribution is shown to dominate the charge-transfer process for this system at low collision energies.

24554 **Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence.** Younger, S.M. (Atomic and Plasma Radiation Division, Center for Radiation Research, National Bureau of Standards, Washington, DC 20234). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 6, 3177-3186(Dec 1982).

Electron-impact ionization cross sections have been calculated in a distorted-wave exchange approximation for seven ions in the argon isoelectronic sequence. For neutral argon, target configuration interaction and term dependence in the ejected-electron continuum were found to be significant influences on the cross section. Similarities of electron ionization and photoionization are discussed. An analytic fit is given which accurately reproduces the distorted-wave cross sections and rate coefficients of argonlike ions with $Z >$ or $= 20$.

24555 **Photoelectron branching ratios and angular distributions for the valence levels of SF_6 in the range $16 <$ or $= h\nu <$ or $= 30$ eV.** Dehmer, J.L.; Parr, A.C.; Wallace, S.; Dill, D. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 6, 3283-3292(Dec 1982). Contract W-31-109-ENG-38.

Photoelectron branching ratios and angular distributions have been measured for the six outermost levels of SF_6 in the range $16 <$ or $= h\nu <$ or $= 30$ eV with the use of synchrotron radiation. These results are discussed in the framework of the large variety of experimental and theoretical studies of SF_6 with dual objective of resolving the long-standing problem of the ordering of the valence shells and of gaining some insight into the role of shape-resonant behavior in the low-energy photoionization continua of SF_6. These objectives are met with partial success in that we tentatively conclude the valence configuration 5a²/sub 1g/4t⁶/sub 1u/1t⁶/sub 2g/3e⁴/sub g/ (1t⁶/sub 2u/+5t⁶/sub 1u/)1t⁶/sub 1g/ ^{1}A/sub 1g/ is most consistent with the available body of evidence and that it is plausible to invoke channel interaction near the strong resonant feature at $h\nu \sim$ 23—24 eV to help account for some of the apparently contradictory evidence. Further experimental and theoretical work is suggested to clarify these issues.

24556 **Semiclassical trajectory effects on C^{0+}-H charge-exchange cross sections at low energy.** Green, T.A.; Riley, M.E.; Shipsey, E.J.; Browne, J.C. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 6, 3668-3671(Dec 1982).

Close-coupling charge-exchange calculations for C^{0+}-H collisions have been carreid out for impact velocities spanning 2.5 x 10^4 to 5 x 10^5 m/s (~3-to-1300—eV H energy). Six appropriate molecular states were included, among which all radial and angular couplings were evaluated using the proton as an electronic origin following the approach of Piacentini and Salin. Four levels of semiclassical approximations for the nuclear motion were investigated and compared: (1) the usual straight-line impact-parameter approximation, (2) the use of a Coulomb trajectory on an effective 6/R potential, (3) the average approximation, which is a form of multitra-

jectory theory, and (4) a uniform semiclassical reference-function method of essentially full quantum accuracy. The results are presented and the validity of these various approximations for the nuclear motion is discussed, for the range of collision energies reported.

24557 **Target-thickness dependence of K-shell vacancy fractions in foil-excited ion beams.** Schneider, D.; Kanter, E.P.; Zabransky, B.J. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review [Section] A: General Physics;* **26**: No. 6, 3700-3701(Dec 1982). Contract W-31-109-ENG-38.

K-shell vacancy fractions have been measured for 2.7- and 0.4-MeV nitrogen ions exiting thin carbon foils as a function of foil thickness. The vacancy fractions per projectile ion were deduced from measuring the yields of K Auger electrons emitted by the foil-excited nitrogen ions. It is found that the vacancy fractions for these ions reach equilibrium only for foils thicker than ~ 20 $\mu g/cm^2$. The variation of vacancy fractions in foils with thicknesses below 20 $\mu g/cm^2$ is a strong function of the projectile energy.

24558 **Collision-free coherent anti-stokes Raman spectroscopy (CARS) of molecular photofragments.** Valentini, J.J.; Moore, D.S.; Bomse, D.S. (Los Alamos National Lab., NM). *Chemical Physics Letters;* **83**: No. 2, 217-221(15 Oct 1981).

Collision-free CARS spectra of molecular oxygen produced in the visible photodissociation of ozone have been obtained. The nascent rotational and vibrational state distributions of the oxygen have been extracted from these spectra.

24559 **Resonance ionization spectroscopy schemes for Ar, Kr and Xe.** Payne, M.G. (Oak Ridge National Lab., TN); Chen, C.H.; Hurst, G.S.; Kramer, S.D.; Garrett, W.R.; Pindzola, M. *Chemical Physics Letters;* **79**: No. 1, 142-148(1 Apr 1981). Contract W-7405-ENG-26.

Laser schemes are suggested for the efficient ionization of Ar, Kr and Xe and the related two-photon transition rates are given. Ionization yields are calculated for each gas with reasonable laser parameters.

24560 **Oscillator strength sums and effective electron number in optical spectroscopy of solids.** Smith, D.Y. (Argonne National Lab., IL); Shiles, E. pp 323-331 of Recent developments in condensed matter physics, Vol. 3. Devreese, J.T.; Lemmens, L.F.; Van Doren, V.E.; Van Royen, J. (eds.). New York, NY; Plenum Publishing Corporation (1981).

Recently developed composite optical data for metallic aluminum are employed to illustrate various definitions of n/sub eff/, the number of electrons effective in an absorptive process. Two effects are demonstrated: the screening of valence-electron processes by the polarizable ion cores and the redistribution of oscillator strength between valence and core electrons.

24561 **Intramolecular dynamics in the quasiperiodic and stochastic regimes.** Noid, D.W.; Koszykowski, M.L.; Marcus, R.A. (Oak Ridge National Lab., TN). pp 133-166 of Quantum mechanics in mathematics, chemistry, and physics. Gustafson, K.E.; Reinhardt, W.P. (ed.). New York, NY; Plenum Publishing Corporation (1981). Contract W-7405-ENG-26.

Nonlinear dynamics has been the subject of intense study in recent years. In this review article, a summary is presented of the authors' recent work in this field, in which nonlinear dynamics is applied to problems involving molecular behavior. Four aspects are described: (1) semiclassical methods for the calculation of bound-state eigenvalues; (2) classical spectra and correlation functions in the quasiperiodic and chaotic regimes; (3) chaotic behavior in quantum mechanics; and (4) applications to collisional and laser interactions. 44 references, 25 figures.

24562 **Photodissociation of nitromethane at 266 nm.** Kwok, H.S.; He, G.Z.; Sparks, R.K.; Lee, Y.T. (Lawrence Berkeley Lab., CA). *International Journal of Chemical Kinetics;* **13**: 1125-1131(1981). Contract W-7405-ENG-48.

In a crossed laser-molecular beam study of nitromethane, it was found that the excitation of nitromethane at 266 nm did not yield dissociation products under collision-free conditions. When a small cluster of nitromethane was excited at the same frequency, the product was seen only at energies and masses consistent with the rupture of the van der Waals bond by vibrational predissociation of the excited state. 3 figures.

24563 **Symmetry simplifications of space types in configuration interaction induced by orbital degeneracy.** Balasubramanian, K. (Lawrence Berkeley Lab., CA). *International Journal of Quantum Chemistry;* **20**: 1255-1271(1981). Contract W-7405-ENG-48.

Symmetry simplifications are introduced in configuration interaction (CI) by reducing the number of symmetry-allowed space types if there is degeneracy in some of the molecular orbitals by constructing the unique space types. A new symmetry group which is called the configuration symmetry group is defined and is shown to be expressible as a generalized wreath product group. Generating functions are derived for enumerating the equivalence classes of space types. A double coset method is expounded which constructs the representatives of all equivalence classes of space types using the cycle index of generalized wreath product and the double cosets of label subgroup with generalized wreath product in the symmetric group S/sub n/ if n is twice the number of occupied and virtual orbitals.

24564 **New look at correlations in atomic and molecular systems. I. Application of fermion Monte Carlo variational method.** Moskowitz, J.W.; Kalos, M.H. (New York Univ., NY). *International Journal of Quantum Chemistry;* **20**: 1107-1119(1981). Contract AC02-76ER03077.

Research is under way directed toward the development of compact and accurate correlation functions for many-electron systems. The computational tool is the variational method in which the many-electron integrals are calculated by Monte Carlo using the fermion Metropolis sampling algorithm. That is, a many-fermion system is simulated by sampling the square of a correlated antisymmetric wave function. The principal advantage of the method is that interelectronic distance r/sub ij/ may be included directly in the wave function without adding significant computational complexity. In addition, other quantities of physical and theoretical interest such as electron correlation functions and representations of Coulomb and Fermi holes are very easily obtained. Preliminary results are reported for He, H_2, and Li_2. 26 references, 3 figures.

24565 **Laser-induced fluorescence of trapped molecular ions: the $CH^+ A^1\pi$ - $X^1\Sigma^+$ system.** Grieman, F.J.; Mahan, B.H.; O'Keefe, A.; Winn, J.S. *Faraday Discussions of the Chemical Society;* No. 71, 191-203(1981). Contract W-7405-ENG-48.

The CH^+ and CD^+ A^1 Pi - $X^1\Sigma^+$ absorption spectra have been obtained by laser excitation of these fragment ions. The ions are contained in a mass-selective quadrupole ion trap under collision-free conditions. The spectra therfore reflect the nascent internal-energy distributions of the ions, which were produced by electron impact on $CH_4(CD_4)$ or $C_2H_2(C_2D_2)$. Both parent gases gave virtually identical spectra; large rotational and vibrational excitation was observed. The equipment was also capable of measuring the radiative lifetime of CH^+ (CD^+) A^3 Pi ($v = 0$), and the measured value, 815 ns, is found to be in good agreement with theoretical calculations of this quantity. 29 references, 6 figures.

24566 **Applications of classical trajectory techniques to reactive scattering.** Muckerman, J.T. (Brookhaven National Lab., Upton, NY). *Theoretical Chemistry: Advances and Perspectives;* **6A**: vp(1981).

This article provides a better understanding of the kinds of systems and chemistry for which the classical trajectory technique is useful. The focus is on how well classical trajectory calculations can account for most detailed aspects of gas-phase, single-collision chemical reactions. The scope of this work is limited to those few systems for which there is sufficient experimental and calculated

data to permit such a comparison, and for which a reasonably appropriate potential energy surface is available. (SC)

6404 Fluid Physics

REFER ALSO TO CITATION(S) 23509, 24135, 24751, 24754, 24791, 24848

24567 **(ANL/NESC—775) HEMP; hydrodynamic elastic-magneto plastic flow.** Wilkins, M.L.; Levatin, J.A. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048775.

The maximum number of J's in any K-line is 101. A problem of up to about 10,000 zones may be run.

The HEMP code solves the conservation equations of two-dimensional elastic-plastic flow, in plane x-y coordinates or in cylindrical symmetry around the x-axis. Provisions for calculation of fixed boundaries, free surfaces, pistons, and boundary slide planes have been included, along with other special conditions.CDC7600; FORTRAN IV, LLL CHAT compiler; SCOPE 2.1; The HEMP main code fills the small core memory (SCM) with the code, working storage, library, and system routines. The large core memory (LCM) utilized is a function of problem size, the amount required is 527,270 (octal) words.

24568 **(ANL/NESC—792) EVITS; steady state two-dimensional fluid flow.** Domanus, H.M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048792.

Maxima of 50 connected line segments to define solution domain, 40 x 40 grid for calculation.

EVITS was developed for estimating steady-state, incompressible, isothermal flow fields in complex two-dimensional geometries. A velocity-stream function formulation is used along with a model to resolve viscous effects at solid boundaries. A number of geometry and ten boundary type options are included to permit specification of a variety of flow situations.IBM360,370; FORTRAN IV; OS/360; 270K bytes of memory, system card input and print output units, and, optionally, disk or tape units used for storage of problem data for subsequent plotting or problem input and error messages.

24569 **(ANL/NESC—847) DISPL1; 1- and 2-dimensional kinetics-diffusion partial differential equations solution.** Leaf, G.K.; Minkoff, M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048847.

Reference report, ANL-77-12 Rev. 1.

DISPL1 is a software package for solving second-order nonlinear systems of partial differential equations including parabolic, elliptic, hyperbolic, and some mixed types. The package is designed primarily for chemical kinetics-diffusion problems, although not limited to these problems. Fairly general nonlinear boundary conditions are allowed as well as interface conditions for problems in an inhomogeneous medium. The spatial domain is one- or two-dimensional with rectangular Cartesian, cylindrical, or spherical (in one dimension only) geometry.IBM370/195,303x;CDC7600,6600,CYBER175; MORTRAN2 (80%) and FORTRAN (20%). By use of the MORTRAN2 preprocessor %F control card, the FORTRAN component is passed through the MORTRAN2 preprocessor along with the MORTRAN component.; OS/370 (IBM370/195,3033), SCOPE 2.1.3 (CDC7600), SCOPE 3.4.4 (CDC6600), NOS1.3 (CDC CYBER175); The IBM version DISPL1 source requires 600K bytes of storage for compilation. Compilation and execution of the DISPL1 sample problems, including the plot creation jobs, requires a maximum of 350K bytes. The CDC version requires a maximum of 121,000 (octal) words of executable storage for the CDC7600, 140,000 (octal) words for the CDC6600, and 135,000 (octal) words for the CYBER175 execution. In the MORTRAN2 preprocessing stage, the user can easily adjust the storage requirements to the optimum for a current problem. In addition to the standard input and print files, the program requires files assigned to logical unit 10 for reading restart data, logical unit 11 for writing data for a later restart, and logical unit 12 for writing plotting data.

24570 **(CONF-810809—31) New data on the heat capacity of liquid ^{3}He.** Roach, P.R.; Eckstein, Y.; Meisel, M.W. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008527.

From 16. international conference on low temperature physics; Los Angeles, CA, USA (19 Aug 1981).

Portions are illegible in microfiche products.

Recent heat capacity measurements on liquid ^{3}He by Haavasoja have shown much smaller values than previous measurements by Wheatley. We have measured P/sub v/(T) from which we can derive values for ∂C/sub v/∂ v. A comparison with values of ∂C/sub v//∂ v obtained from the actual heat capacity measurements shows agreement between our data and those from the heat capacities of Wheatley but disagreement with those from the heat capacities of Haavasoja. This suggests that the large discrepancy between the two sets of heat capacities originates with a problem in the data of Haavasoja.

24571 **(NP—3770038) Yield of the oxidation of very rarefied propane/air mixtures in catalytic fluidized beds.** Holtmann, H.D. (Bochum Univ. (Germany, F.R.). Abt. Maschinenbau und Konstruktiven Ingenieurbau). 21 Feb 1980. 137p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83770038.

Thesis.

Experts have only recently disagreed about the ruling research work in the field of gas/solid fluidized beds, whether gas remixing in the suspension phase is possible. Remixing is a decisive unknown quantity for catalytic reactions which lowers the desired high degree of conversion. The degree of conversion depending on its influencing parameters was determined in this study. The minimum fluidization rate as well as the corresponding height and porosity are determined to characterize the fluidized bed state for the chosen system and operation parameters and are checked with published correlations. Particular attention should be paid to the description of the catalyst and its physical and chemical properties, as well as to the flow mechanical state. The oxidation of a greatly rarefied propane/air mixture serves as model reaction.

24572 **Universal behavior in the electrical conductivity of strong-scattering expanded fluid metals.** Laughlin, R.B. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 7019-7022(15 Dec 1982). Contract W-7405-ENG-48.

We have observed that the resistivities of a number of strong-scattering expanded fluid metals are a simple universal function of the volume gained upon expansion. We discuss possible causes of this effect.

24573 **Self-similar solutions for converging shocks and collapsing cavities.** Lazarus, R.B. (Los Alamos Scientific Lab., NM). *SIAM (Society for Industrial and Applied Mathematics) Journal on Numerical Analysis;* **18**: No. 2, 316-371(Apr 1981).

A complete analysis is attempted of the self-similar solutions for the converging shock and collapsing cavity problems, in spherical and cylindrical geometry, for a perfect gas with arbitrary adiabatic exponent $\gamma > 1$. Emphasis is given to the rich variety of previously neglected nonanalytic solutions, and to a numerically and what can be derived algebraically. New solutions are described which contain additional converging shocks, arriving at the origin concurrently with the initial shock or free surface. Some of these new solutions are entirely analytic, except at the shocks themselves, and some are not; in some cases, only one secondary shock is possible, in other cases an arbitrary number. The physical significance of previously rejected partial solutions is discussed. The stability of solutions is discussed in a narrow (one-dimensional) sense. Finally, a study is urged of the asymptotic approach (or nonapproach) to self-similarity of direct numerical integrations of the original partial dif-

ferential equations; it is argued that the evidence for approach to a unique self-similar solution is not convincing.

6450 High Energy Physics

24574 **High energy spin physics - 1982.** Bunce, G.M. (ed.). New York; American Inst. of Physics (1983). 663p. (CONF-820941—). American Inst. of Physics, 335 East 45th Street, New York, New York 10017. Order Number DE83008951. Contract AC02-76CH00016.

From 5. international symposium on high energy spin physics; Upton, NY, USA (16 Sep 1982).

Portions are illegible in microfiche products.

The papers presented were entered into the data base separately. (WHK)

6451 Particle Interactions And Properties - Experimental

REFER ALSO TO CITATION(S) 24608, 24619

24575 **(BONN-HE—82-16) Results from PETRA.** Hilger, E. (Bonn Univ. (Germany, F.R.). Physikalisches Inst.). Jul 1982. 31p. (CONF-8205116—4). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750137.

From 5. international conference on novel results in particle physics; Nashville, TN, USA (24 May 1982).

A selection of most recent results obtained by the five experiments CELLO, JADE, MARK J, PLUTO, and TASSO at PETRA is presented. The many interesting new results include, for example, the observation of effects of 2sup(nd) order QCD, details of inclusive hadron production, and the measurement of the forward-backward asymmetry in lepton pair production due to week and electromagnetic interference.

24576 **(DOE/ER/03069—T3) Production mechanisms of high mass muon pairs. Technical report number 117.** Antreasyan, D.; Atwood, W.; Becker, U. (Massachusetts Inst. of Tech., Cambridge (USA). Lab. for Nuclear Science). 11 Mar 1981. Contract AC02-76ER03069. 13p. NTIS, PC A02/MF A01. Order Number DE83009156.

We report the results of a study of the production mechanism of inclusive dimuon production from the reaction $p + p \rightarrow \mu \mu + X$ at CERN-ISR. The present experiment was done at the center of mass energies $\sqrt{s}$ + 62 and 44 GeV and in the dimuon pair invariant mass region m = 3 to 25 GeV. The dependence on the Feynman variable x has been measured. The average transverse momentum is found to increase with $\sqrt{s}$ and with mass and reaches <p/sub T/> = 1.9 GeV and is compatible with predictions from QCD gluon processes.

24577 **(DOE/ER/40033—8) High p/sub T/ π0 production with $\alpha\alpha$ and αp beams at the CERN ISR.** Angelis, A.L.S.; Baltay, C.; Basini, G. (Rockefeller Univ., New York (USA). Dept. of Experimental Physics; European Organization for Nuclear Research, Geneva (Switzerland)). Jul 1981. Contract AC02-81ER40033. 12p. (CONF-810760—2). NTIS, PC A02/MF A01. Order Number DE82000593.

From International conference on high energy physics (Or European Physical Society conference); Lisbon, Portugal (9 Jul 1981).

The invariant cross-sections of π^0's produced in $\alpha\alpha$ and αp collisions at the ISR were measured out to 7 GeV/c in p/sub T/. These measurements will be compared with π^0 production in pp collisions at equivalent values of $\sqrt{s}$/nucleon, and the variation of the nuclear A-dependence term α with p/sub T/ will be determined. Correlations of π^0's with the trigger π^0 will also be presented.

24578 **(LA—8775-C) Proceedings of the workshop on nuclear and particle physics at energies up to 31 GeV: new and future aspects.** Bowman, J.D.; Kisslinger, L.S.; Silbar, R.R. (eds.). (Los Alamos National Lab., NM (USA); Carnegie-Mellon Univ., Pittsburgh, PA (USA)). Mar 1981. Contract W-7405-ENG-36. 577p. (CONF-810115—). NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report contains the proceedings of the LAMPF Workshop on Nuclear and Particle Physics at Energies up to 31 GeV, New and Future Aspects, held in Los Alamos, January 5 to 8, 1981. Included are invited talks and contributed papers covering recent developments in (a) weak and unified interactions (including discussions of neutrino oscillations), (b) the hadronic description of strong interactions, (c) the quark description of strong interactions, (d) hypernuclei, and (e) new facilities and proposed experiments. One of the motivations for the Workshop was to explore physics justifications for a future high-intensity proton accelerator in this energy regime. Separate abstracts were prepared for papers from this meeting. Six papers were previously included in the data base.

24579 **(LA—8775-C, pp 8-17) Perspectives on weak interactions.** Cabibbo, N. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The advances in experimental facilities and methods offer new opportunities for pushing down the limits on theoretically unexpected phenomena. These opportunities are as important as those offered by conducting experiments that are suggested by current theory. This talk concentrates on the latter, and in particular on the possible contributions of experiments carried out at intermediate energies with high intensity facilities. Areas discussed are: (1) precision tests of the Glashow-Salam-Weinberg (GSW) theory; (2) quark mixing and CP-violation; and (3) grand unified theories and neutrino oscillations.

24580 **(LA—8775-C, pp 18-35) Experiments in the kaon system.** Winstein, B. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

In this talk, we will review current experiments on kaon decays with a strong emphasis on those addressing the question of CP non-conservation. Experiments which could only be attempted with significantly more intense Kaon beams than now exist (Kaon Factory experiments) are also discussed. A point of view, currently ascribed to by the author, has been adopted for this talk: The Kobayashi-Maskawa model which links the CP non-conservation to the mass mixing among the quark doublets is most appealing and it is extremely important to test it against the superweak hypothesis.

24581 **(LA—8775-C, pp 36-57) Rare decays of pions & muons: a review.** Hargrove, C.K. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A general review of rare decays of pions and muons is given. The status of rare decays of pions and muons in the context of unified gauge theories is briefly discussed. The status of the experimental evidence is reviewed. Finally, an overview of current experiments is given.

24582 (LA—8775-C, pp 92-93) **Quark-diagram contribution to K/sub L/ → γ γ.** Ma, E.; Pramudita, A. (Univ. of Hawaii, Honolulu). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219. Contract AC03-76ER00511.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

We compute the one-loop quark-diagram contribution to K/sub L/ → γ γ in the standard model, without making the usual approximation that the internal quark masses are much smaller than the W-boson mass.

24583 (LA—8775-C, pp 94-95) **Preliminary report on a new pion beta decay experiment.** Highland, V.L.; McFarlane, W.K.; Auerbach, L.B. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The conserved vector current hypothesis (CVC), a cornerstone of the unified theory of electromagnetic and weak interactions, provides a precise prediction for the branching ratio of the pion beta decay reaction $\pi^+ \rightarrow \pi^0 e^+ nu$. The predicted ratio is 1.045×10^{-8} with an uncertainty of 0.5% due to errors in the pion masses and an additional 1% uncertainty due to the electromagnetic corrections. We have just completed taking data on a new pion beta decay experiment. Here we present a preliminary report on the experiment to indicate the extent and quality of the data obtained. In contrast to previous experiments done with stopping pions, this one observes decays in flight of a 400-MeV π^+ beam in the P^3 East Channel at LAMPF.

24584 (LA—8775-C, pp 97-124) **Neutrino oscillations.** Mann, A.K. (Univ. of Pennsylvania, PA). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219. Contract AC02-76ER03071.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A status report on neutrino oscillations is presented. Reasons are given for the increasing interest in neutrino oscillations, and the theory is reviewed with illustrative examples. A summary of types of neutrino oscillations experiments and of data available at the moment is given. Some representative proposed neutrino oscillation experiments are discussed with emphasis on experiments at LAMPF and the BNL AGS.

24585 (LA—8775-C, pp 125-133) **Grenoble neutrino experiment.** Hahn, A. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The electron-antineutrino spectrum has been measured at a 8.76 m positron from the point-like core of the ILL ^{235}U fission-reactor, using the reaction anti nu/sub e/ + p → e^+ + N. Positrons and neutrons were detected in coincidence by means of a low-background liquid scintillator and ^3He detector system. The observed neutron correlated positron spectrum is consistent with an experimentally derived spectrum assuming no neutrino oscillations. Upper limits for the oscillation parameter are presented.

24586 (LA—8775-C, pp 134-140) **Status of U.C. Irvine neutrino oscillation detector.** Pasierb, E.L.; Gurr, H.S.; Kropp, W.R.; Mandelkern, M.; Nakamura, S.Y.; Price, L.; Reines, F.; Sobel, H.W. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Updated theoretical calculations of the reactions anti nu/sub e/ + d → n + p + anti nu/sub e/ and anti nu/sub e/ + d → n + n + e^+ have increased the value of the ratio of ratios, R, from values ranging between 0.38 and 0.40 to .41 and .43. A moveable neutrino oscillation detector is nearing completion and should be installed at a 2000 MW fission reactor at the Savannah River Plant this summer. The positron energy spectrum will be measured at distances ranging from 13 to 50 meters from the center of the reactor core.

24587 (LA—8775-C, pp 154-165) **Phenomenological analysis of reactor data for neutrino oscillations.** Silverman, D. (Univ. of California, Irvine); Soni, A. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Reactor data from experiments performed at different distances is analyzed. We find that no distance independent reactor anti nu/sub e/ spectrum, irrespective of its shape, can account for all the data with a CL ≧ .0028. Oscillation with 3(2)nu's yield fits to all the 4 experiments with CL ≃ .06 (.03) and to the two high statistics experiments with CL ≧ .31 (.18).

24588 (LA—8775-C, pp 166-184) **πN, anti KN, and KN phenomenology.** Kelly, R.L. (Lawrence Berkeley Lab., CA). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The current status of experimental and phenomenological knowledge of the spectrum of N, Δ, Y^*, and possible Z^* resonances is reviewed. The review concentrates on formation experiments, partial wave analyses, and quark models of baryon resonances. Particular emphasis is given to areas in which there are promising opportunities for future research.

24589 (LA—8775-C, pp 220-255) **Experimental evidence for dibaryons.** Spinka, H. (Argonne National Lab., IL). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This talk will attempt to summarize some of the experimental evidence dealing with dibaryon resonances. Specific suggestions for future measurements will be made.

24590 (LA—8775-C, pp 271-299) **Antiproton-nucleon experiments.** Tripp, R.D. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Recent investigations of antinucleon-nucleon interactions are in direct conflict with earlier experiments concerning the existence of narrow structures in the anti p N system. We here review the current status of formation experiments, summarize and comment upon production experiments, and point out deficiencies in the data.

24591 (LA—8775-C, pp 300-318) **Research program at Lear.** Dalpiaz, P. (Ferrara Univ., Italy). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The CERN LEAR Program is outlined. The approved experiments are described, together with the possible future developments in the same field.

24592 (LA—8775-C, pp 319-322) **Searching for structure in nucleon-antinucleon interactions near threshold.** McFarlane, W.K. (Temple Univ., Philadelphia, PA). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The purpose of this paper is to help make the case for a new machine being an antiproton factory as well as a kaon factory. The energy of such a high-intensity accelerator should be near 30 GeV, rather than the 15 GeV which would be adequate for the production of kaons as the most massive particle. Primarily, we wish to point out that there are regions of nucleon-antinucleon interactions which have not been carefully explored and which may contain interesting phenomena despite existing negative experiments.

24593 (LA—8775-C, pp 368-380) **Internal spin structure of the proton from high energy polarized e-p scattering.** Hughes, V.W. (Yale Univ., New Haven, CT). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219. Contract AC02-76ER03075.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A review is given of our experimental knowledge of the spin dependent structure functions of the proton, which is based on inclusive high energy scattering of longitudinally polarized electrons by longitudinally polarized protons in both the deep inelastic and resonance regions, and includes preliminary results from our most recent SLAC experiment. Implications for scaling, sum rules, models of proton structure, and the hyperfine structure interval in hydrogen are given. Possible future directions of research are indicated.

24594 (LA—8775-C, pp 413-457) **Λ and Σ hypernuclear physics.** Barnes, P.D. (Carnegie-Mellon Univ., Pittsburgh, PA). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A general review of progress in hyper-nuclear physics is given. The current status of the development of the Λ-nucleus shell model is reported together with a discussion of the nuclear spin-orbit force for N, Δ, Λ and Σ nuclei. Natural line width calculations are compared to the data for the strong component of the Λ and Σ nucleus interaction. Calculations of the role of the four fermion weak interaction in the weak decay of Λ hypernuclei are compared to lifetime data. Special topics in two body and few body systems are also reviewed.

24595 (LA—8775-C, pp 458) **Preliminary report on an experiment to observe Σ hypernuclei in the 1p shell nuclei.** Hungerford, E.V. (Univ. of Houston, TX); Bart, S.; Hackenburg, R. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219. Contract AS05-76ER03948;AM06-76RL02230;AC02-76ER03244.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

An experiment designed to observe sigma hypernuclei in ^{6}Li and ^{16}O is in progress on the LESBI line at the Brookhaven AGS. The reaction (K^-, π^+) is used, which populates only the highest isopin states in the Σ hypernucleus. The intrinsic spectrometer resolution and finite size of the target provide an energy resolution in the excitation energy spectrum of approximately 3 MeV (FWHM). Preliminary data are interesting and may be used to extract information on the Σ-nucleus well depth and the expected Σ-hypernucleus level structure.

24596 (LA—8775-C, pp 487-498) **Speculative ten-year plan for nuclear physics at LAMPF.** Thiessen, H.A. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Recent results in nuclear physics at LAMPF are reviewed. Possibilities for several projects are briefly discussed, including a new low-energy pion spectrometer, a high-intensity polarized ion source, and utilization of the proton storage ring as a 1.5 GeV d.c. electron machine during the several months of each year that LAMPF is down. Some detailed proposals for facilities for nuclear physics at a high-intensity 30 GeV proton machine are discussed, and a second-order design for a kaon beam for use with the (K^-, π^-) reaction is given.

24597 (LA—8775-C, pp 519-525) **Results of a first round 150 MeV nu/sub μ/ oscillation experiment and implications for future LAMPF experiments.** Cortez, B. (Harvard Univ., Cambridge, MA); LoSecco, J.; Sulak, L.; Soukas, A.; Weng, W. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

We report on a sensitive search for neutrino oscillation. A pure nu/sub μ/ beam of low energy was constructed at the Brookhaven AGS. The appearance of any nu/sub e/ in the beam would signify oscillations. To maximize sensitivity the energy of the neutrino beam was reduced to 150 MeV. The existing neutrino beam line and a 30T liquid scintillation calorimeter used in previous nu p scattering experiments were utilized.

24598 (LA—8775-C, pp 526-535) **Normal muon decay and the Los Alamos TPC project.** Kinnison, W.W. (Los Alamos National Lab., NM). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Los Alamos National Laboratory high-statistics muon decay experiment, which utilizes a time projection chamber (TPC) for the detector, is described. The anticipated improvement in the experimental limits on the weak interaction coupling constants and their possible theoretical implications are presented. The discussion concludes with a status report on the experiment.

24599 (LA—8775-C, pp 536-540) **Search for muon number violation at LAMPF.** Hoffman, C.M. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A group from Los Alamos, Stanford and Chicago is planning to search for the muon number violating processes $\mu^+ \rightarrow e^+\gamma$, $\mu^+ \rightarrow e^+e^+e^-$ and $\mu^+ \rightarrow e^+\gamma\gamma$ in a large modularized sodium iodide (NaI) detector known as the Crystal Box. A list of participants is

shown. A schematic view of the apparatus is shown. The detector consists of the array of NaI crystals which surround 36 scintillation counters, a 700-wire cylindrical drift chamber and a thin target in which μ^+'s stop and decay. There will be 360 crystals measuring 6.3 x 6.3 x 30.5 cm each viewed by a photomultiplier and 36 crystals measuring 6.3 x 6.3 x 70 cm, viewed by two photomultipliers. The detector totals approximately 2 tons of NaI. The detector has a solid angle of 60% of 4π for the detection of one particle and about 25% of 4π for the detection of a 3-body decay.

24600 (LA—8775-C, pp 561-566) **Recent results and physics at a future high intensity facility of E ≦ 31 GeV.** Henley, E.M. (Univ. of Washington, Seattle). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Recent theoretical and experimental investigations have shown the value and necessity of searches for rare events and of high precision experiments. For such investigations a high intensity and higher energy accelerator which can produce new beam such as kaons and antiprotons should be very helpful. At the present time there are more questions than answers. Thus, we do not understand the connection between nuclear physics as we have known it, with meson exchange forces, and the quark-parton model with QCD forces. We do not understand quark confinement. We do not understand the connection of the electroweak and QCD forces. Although there are conjectures and theories, experimental proof is required. Our grasp of weak forces and of nuclear structure should prove helpful in proposing theoretical answers. A high intensity higher energy accelerator should be helpful in providing the required experimental confirmation.

24601 **Study of A_3 production in the reaction $\pi^- p \rightarrow K^0 K^- p$ at 50, 100, and 175 GeV/c.** Bromberg, C.; Dickey, J.O.; Fox, G. (California Institute of Technology, Pasadena, California 91125). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 1-11(1 Jan 1983).

The reaction $\pi^- p \rightarrow K^0 K^- p$ has been measured from 50 to 175 GeV/c. The production characteristics of the A_3 have been analyzed. We find spin and t dependence similar to lower energies, but the cross section falls rapidly with energy. In a Regge description of $\pi^- p \rightarrow A_3^- p$ our data imply a rather small Pomeron-exchange component.

24602 **Ratio σ/sub L//σ/sub T/ from deep-inelastic electron scattering.** Mestayer, M.D.; Atwood, W.B.; Bloom, E.D.; Cottrell, R.L.A.; DeStaebler, H.; Prescott, C.Y.; Rochester, L.S.; Stein, S.; Taylor, R.E.; Trines, D. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 285-288(1 Jan 1983). Contract AC03-76SF00515.

Values of R = σ/sub L//σ/sub T/ for deep-inelastic electron-nucleon scattering have been derived from several experiments with incident electron energies up to 20 GeV. Included are previously unpublished measurements at intermediate angles (largely at 15° and 18°). An average value of R = 0.22 +- 0.1 is obtained for the kinematic region covered by the experiments. No significant kinematic dependence of R is observed. A table of extracted values of the structure functions νW_2 and $2MW_1$ is also presented.

24603 **Brookhaven: glueballs.** *CERN Courier;* **22**: No. 10, 415-416(Dec 1982).

Published in summary form only.

6452 Particle Interactions And Properties - Theoretical

REFER ALSO TO CITATION(S) 24578, 24579, 24580, 24584, 24588, 24598

24604 **(BONN-HE—82-17) Direct determination of the quark density ratio d(x)/u(x) in the proton from νp and anti νp interactions.** Geich-Gimbel, C. (Bonn Univ. (Germany, F.R.). Physikalisches Inst.). Jul 1982. 10p. (CONF-8206117—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750139.

From 13. international symposium on multiparticle dynamics; Volendam, Netherlands (6 Jun 1982).

Aachen-Bonn-CERN-Muenchen-Oxford Collaboration.

Charged current νp and anti νp interactions observed in exposures of BEBC filled with hydrogen to a wideband neutrino and antineutrino beam are analyzed to yield the quark density ratio d/u as function of x. The method has minimum bias. The dominance of u quarks at large x is clearly seen.

24605 **(CONF-820899—3) Successes and failures of the constituent quark model.** Lipkin, H.J. (Argonne National Lab., IL (USA); Weizmann Inst. of Science, Rehovoth (Israel); Fermi National Accelerator Lab., Batavia, IL (USA)). 1982. Contract W-31-109-ENG-38. 59p. NTIS, PC A04/MF A01. Order Number DE83008684.

From Summer school on nuclear dynamics; Victoria, BC, Canada (23 Aug 1982).

Our approach considers the model as a possible bridge between QCD and the experimental data and examines its predictions to see where these succeed and where they fail. We also attempt to improve the model by looking for additional simple assumptions which give better fits to the experimental data. But we avoid complicated models with too many ad hoc assumptions and too many free parameters; these can fit everything but teach us nothing. We define our constituent quark model by analogy with the constituent electron model of the atom and the constituent nucleon model of the nucleus. In the same way that an atom is assumed to consist only of constituent electrons and a central Coulomb field and a nucleus is assumed to consist only of constituent nucleons hadrons are assumed to consist only of their constituent valence quarks with no bag, no glue, no ocean, nor other constituents. Although these constituent models are oversimplified and neglect other constituents we push them as far as we can. Atomic physics has photons and vacuum polarization as well as constituent electrons, but the constituent model is adequate for calculating most features of the spectrum when finer details like the Lamb shift are neglected. 54 references.

24606 **(DOE/ER/70004—295) Flavor-changing electromagnetic transitions.** Deshpande, N.G.; Eilam, G. (Oregon Univ., Eugene (USA). Inst. of Theoretical Science). Jun 1981. Contract AT06-76ER70004. 25p. NTIS, PC A02. Order Number DE82008305.

Paper copy only, copy does not permit microfiche production.

We compute the q/sub i/q/sub j/γ transition amplitude for off-shell and on-shell quarks with flavors i not equal to j, in the standard weak interaction model. The results we present are valid for all quark and photon momenta and for all external and internal quark masses. We discuss the Feynman rules and Ward-Takahashi identities in the 't Hooft-Feynman gauge. Our results can be applied to a variety of phenomena such as the electric dipole moment of the neutron, the process $e^+ e^- \rightarrow$ t anti c, and flavor changing transitions with either gluon or photon emission.

24607 (LA—8775-C, pp 58-84) **Muon number violating kaon decays.** Herczeg, P. (Los Alamos National Lab., NM). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

We discuss the decays K/sub L,S/ → μe, K/sub L,S/ → $\pi^0 \mu e$, and $K^{+-} \rightarrow \pi^{+-} \mu e$ in current theoretical schemes which imply the existence of neutral flavor-changing bosons. Possible pat-

terns for the branching ratios of these decays are considered taking into account constraints imposed by pertinent data.

24608 (LA—8775-C, pp 85-91) **Grand unified particle physics and a high-intensity intermediate energy machine.** Goldman, T. (Los Alamos National Lab., NM). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A high-intensity facility will allow precision tests of expected effects and better searches for effects which are expected to be absent or unobservably small. Both cases can have significant impact on the search for the correct Grand Unified Theory. Neutrino oscillation experiments at a high-intensity facility are to be encouraged and can also have a strong impact on GUTS. The burning question remains: why is the muon, or in more modern guise: what (if any) is the horizontal gauge symmetry, and what is the scale for violating this symmetry if it exists. A high-intensity intermediate energy facility offers one of the best opportunities available to answer these questions.

24609 (LA—8775-C, pp 185-188) **Odd-parity baryons: progress and problems.** Cutkosky, R.E. (Carnegie-Mellon Univ., Pittsburgh, PA). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The odd-parity baryons have provided a graveyard for many cherished ideas about hadrons. The simple quark shell model, with QCD-inspired phenomenological perturbations, is the only model able to describe the states with even partial qualitative success. There are also important unexplained residual dynamical effects. Resonance decays can be accounted for, provided the usual spectator model is abandoned. Better experimental data could help to sort out the many remaining puzzles.

24610 (LA—8775-C, pp 211-219) **I=1 dibaryons - theoretical.** Kloet, W.M. (Rutgers Univ., New Brunswick, NJ). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

New data analyses predict resonance poles close to the NΔ branchcut. Model calculations show $^3F_3$ and $^1D_2$ phase parameters in qualitative agreement with the data, but cannot make definitive statements about resonances yet. They show, however, that counterclockwise loops in Argand diagrams are not always resonances.

24611 (LA—8775-C, pp 267-270) **Relation between dσ (p + d $\rightarrow$ ^{3}He + γ) and dσ (p + d $\rightarrow$ ^{3}He + π^0) at intermediate energy based on isobar dominance.** Nefkens, B.M.K.; Briscoe, W.J.; Fitzgerald, D.H.; Silverman, B.H. (Univ. of California, Los Angeles). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The reaction mechanism responsible for the reactions p + d $\rightarrow$ ^{3}He + γ and p + d $\rightarrow$ ^{3}He + π^0 are quite likely rather similar. We speculate that they involve the excitation of an intermediate state isobar, analogous to pion production in NN interactions. The leading candidate for the isobar at our incident beam energies is the P_{33} (1232) πN resonance.

24612 (LA—8775-C, pp 323-343) **Implications of QCD for soft hadronic and nuclear processes.** Hwa, R.C. (Univ. of Oregon, Eugene). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219. Contract AM06-76RL02230.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Physical implications of QCD for strong forces in soft processes are discussed. Topics include long-range force, Van der Waals force, nuclear force, hadron and quark structures. In the absence of a reliable calculational scheme, phenomenological models have been built that incorporate QCD ideas as far as possible. In the framework of those models calculations have been made that provide an understanding of the soft processes in terms of quarks and gluons. We review recent work on nuclear potential, form factors at low Q^2, pion decay constant, inclusive distribution of low p/sub T/, and radiation length of fast quark in nuclear matter.

24613 (LA—8775-C, pp 344-356) **Quark bags.** Kerman, A.K. (Massachusetts Inst., of Technology, Cambridge). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This short talk gives some very general comments on what I see as the impact on nuclear physics of the last ten years' developments in the picture of the nucleon and the hadron. On the other hand there may also be some nuclear physics lessons - lessons we've learned by trying to deal with the multi-fermion system over a long period - and I will discuss what those lessons might be for the problem at hand, hadron phy-physics up to 31 GeV. After that I will discuss a number of implications of quarks for low energy physics.

24614 (LA—8775-C, pp 381-387) **Three strange quark system.** Aerts, A.T.; Heller, L. (Los Alamos National Lab., NM). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A potential model for the heavy three quark system is explained, which results in Coulomb-like two-body and confining three-body interactions between the quarks. Asymptotic freedom effects are included. The application of this potential to the Ω^- (s^3) system is discussed and its predictions are compared to those of a purely two-body potential model.

24615 (LA—8775-C, pp 400-409) **Joining the quark and hadron exchange descriptions of strong interactions.** Lomon, E. (Massachusetts Inst. of Tech., Cambridge). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Quark structure of hadrons cannot be ignored in hadron-hadron interactions which already probe the region of asymptotic freedom at relatively low energies. But one cannot compute the full interaction directly with QCD because: (1) very high order processes enter at medium and small momentum transfer; (2) bag models approximate confinement, and (3) contain no theoretical information on longer range interactions of (unconfined) color singlet pairs. Our present understanding of nucleon-nucleon and nuclear data implies that nucleon degrees of freedom and hadronic field theory are adequate descriptions for r $\geq$ 1 fm. The total potential fits np and pp data for laboratory energy E/sub L/ < 400 MeV. For higher energies the dynamic effects of production thresholds must be in-

cluded. Work by Kloet and Silbar and by Lomon has shown that these can account for data up to E/sub L/ = 800 MeV, including the dibaryonic structures seen.

24616 (LA—8775-C, pp 410-412) **Supernuclei, supernuclear matter & SU(4) symmetry.** Bhamathi, G. (Univ. of Alberta, Edmonton). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The possible existence of light supernuclei and the binding of charmed baryons in nuclear matter has been studied using OBEP under SU(4) symmetry. Bound light supernuclei such as C_1N (I=3/2, J=0), C_1NN(I=2, J=1/2) and C_6NN(I=1, J=1/2, I=0, J=1/2 and 3/2) are predicted and the binding of C in nuclear matter is expected to be much stronger than that of baryons.

24617 (LA—8775-C, pp 459) **Study of the T = 3/2 ΣN interaction.** Rosenthal, A.S. (TRIUMF, Vancouver, British Columbia). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

One boson exchange models of the ΣN interactions have been studied, preparatory to a full investigation of Σ-hypernuclei. The simplest channel is T = 3/2 where the strong decay ΣN → ΛN is isospin forbidden and in which there is the outstanding problem of a possible Σ^-n bound state. Standard analyses proceed by fitting meson coupling constants to NN and the small amount of ΛN and ΣN data, a procedure which involves a large number of free parameters. This analysis has used the OBEP with recent parameters derived from meson-baryon scattering, an independent source of information.

24618 (LA—8775-C, pp 475-476) **Uncertainty in the K^+-nucleus interaction below 1 GeV.** Cotanch, S.R. (North Carolina State Univ., Raleigh). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Corrections to the first-order, multiple scattering K^+-optical potential are investigated through simple model calculations. For lab energies up to 1 GeV rough theoretical error bounds are determined for each of the following effects: form factor momentum dependence (off-shell behavior), angle transformation of kaon-nucleon (KN) t-matrix, additional elementary KN partial wave amplitudes and different phenomenological KN phase shifts.

24619 (LA—8775-C, pp 507-518) **Neutron oscillations.** Anderson, H.L. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

There is no reason to believe that baryon number should be a good quantum number. No violation of this conservation law has yet been seen. However, we are living in a period when it has become popular and important to look for ways in which the symmetries and their corresponding conservation laws might be broken. In fact, there now exist a plethoria of theories, the so-called unified theories in which baryon number emerges unconserved. In particular, for some theories, Δ B = 2 is allowed at a level that should make a process like n reversible anti n observable in the laboratory. This paper discusses how a practical test of such theories might be made.

24620 (LA—8775-C, pp 541-546) **Can exotic phenomena be induced in low energy antiproton-nucleus collisions.** DeVries, R.M.; DiGiacomo, N.J. (Los Alamos Scientific Lab., NM). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

It appears that nuclear reactions (induced by light or heavy ions) are dominated by nucleon-nucleon (N-N) collisions at least to the 10% level in σ/sub R/ 1). Therefore studies of anti p-nucleus (anti p-eta) interactions are likely to reveal fascinating new aspects of nuclear science because the anti N-N interaction is radically different from the N-N case, particularly at low incident energies (E/sub i/<500 MeV). First of all, low energy anti N-N elastic scattering is quite forward peaked while N-N systems exhibit fairly isotopic angular distributions. Secondly, there are two new components to σ/sub T/ which do not exist in the N-N case: a) charge exchange, which is always <5% of σ/sub T/, and (b) annihilation which is large, particularly at low incident energies.

24621 (LA—8775-C, pp 547-560) **Effects of strong attraction in antiproton-nucleus scattering.** DiGiacomo, N.J.; DeVries, R.M. (Los Alamos National Lab., NM). Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Since the observation of the antiproton 25 years ago, much theoretical and experimental consideration has been given to the interaction of antinucleons with nucleons and deuterons. To this day aspects of the interaction, such as the annihilation process and the existence of bound states and resonances, stand as interesting unsolved problems. Surprisingly, anti NN studies have not engendered parallel investigations of anti p nucleus (anti pA) scattering. Little quantitative information exists for the anti pA system, particularly at energies below 1 GeV. To this end, we discuss means of obtaining quantitative insight into the anti pA interaction by examining the sensitivity of the total reaction cross section (σ/sub R/) to the strength and energy dependence of the attraction.

24622 (LA—9572-C-Vol.1, pp 136-155) **What can be learned from strong elementary hadronic interactions at and below 16 GeV.** Lomon, E.L. (Massachusetts Inst. of Tech., Cambridge). Nov 1982. NTIS, PC A18/MF A01. Order Number DE83005000.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Portions are illegible in microfiche products.

Hadronic field theory is impossible to calculate at short range because it requires very high order processes. Moreover it is an unacceptable theory if we believe in the underlying quark and gluon structure. On the other hand quantum chromodynamics is simplified by asymptotic freedom at short distances. What can hadronic probes discover about the detailed dynamics of light quarks and gluons. We review the following aspects: how quark structure is related to available intermediate energy data - not through resonances, but through f- (or P) matrix poles; the conditions for the existence of narrow resonances related to quark degrees of freedom; experimental requirements for data appropriate to analyzing quark dynamics; variable energy, polarized beam intensity, high duty factor; and improving the precision of the relation to quark dynamics, otaining further information on the nature of asymptotic freedom, confinement, and hidden color effects.

24623 **Radiative decay width of the rho^- meson.** Jensen, T.; Berg, D.; Chandlee, C. (University of Rochester, Rochester, New York 14627). *Physical Review [Section] D: Particles and Fields;* **27**: No. 1, 26-46(1 Jan 1983).

We present data on coherent rho^- production on nuclear targets and our application of the Primakoff formalism for extracting the radiative decay width for the transition $rho^- \rightarrow \pi^- \gamma$. Assuming

the presence of both electromagnetic and strong contributions to coherent production, we obtain $\Gamma(\rho^- \to \pi^- \gamma) = 71 \pm 7$ keV, a result in good agreement with SU(3).

24624 **Nature of nonperturbative effects in lepton-nucleon scattering.** Barnett, R.M. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 98-104(1 Jan 1983). Contract AC03-76SF00515.

There is evidence for substantial nonperturbative effects in the structure functions extracted from deep-inelastic lepton-nucleon scattering. These effects have a major impact on α_s and Λ determinations. Results which I reported previously for μN and νN scattering (F_2 and xF_3) are extended to include ed data which are at lower W^2 and higher x and have extremely high statistics. Possible analytical forms for higher-twist terms and for α_s are considered in detail here using μN, νN, and ed data.

24625 **Scaling violations in inclusive e^+e^- annihilation spectra.** Peterson, C.; Schlatter, D.; Schmitt, I.; Zerwas, P.M. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 105-111(1 Jan 1983). Contract AC03-76SF00515.

The origin of the observed scaling violations in inclusive e^+e^- annihilation is investigated. Perturbative jet evolution is not necessarily the only reason for scale breaking in the hadron spectra at present energies. Remnants of finite-transverse-momentum and mass effects are still important in nonperturbative, cascade-type, jet formation in the $\sim$10 GeV range. Heavy-quark fragmentation has a strong impact on hadronic inclusive spectra. A simple parametrization for the heavy-quark fragmentation function is given which describes well recently measured charmed-meson spectra. Taking these effects into account, good agreement with the observed scaling violations is obtained in cascade-type jet models with hard-gluon bremsstrahlung.

24626 **Highly relativistic nucleus-nucleus collisions: The central rapidity region.** Bjorken, J.D. (Fermi National Accelerator Laboratory,* P.O. Box 500, Batavia, Illinois 60510). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 140-151(1 Jan 1983).

The space-time evolution of the hadronic matter produced in the central rapidity region in extreme relativistic nucleus-nucleus collisions is described. We find, in agreement with previous studies, that quark-gluon plasma is produced at a temperature $>$ or $\approx$200—300 MeV, and that it should survive over a time scale $>$ or $\approx$5 fm/c. Our description relies on the existence of a flat central plateau and on the applicability of hydrodynamics.

24627 **Quark-tadpole transitions and the $\Delta I = (1/2)$ rule in K decays.** McKellar, B.H.J.; Scadron, M.D. (Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 157-165(1 Jan 1983).

We show that the Nambu-Goldstone structure of the tightly bound q-barq pion and kaon allows the weak s-d quark tadpole to contribute to the $\Delta S = 1$ nonleptonic weak decay amplitudes. This tadpole, bound to the kaon in a quark loop, accounts for the $\Delta I = (1/2)$ rule and the observed magnitude of the $\Delta I = (1/2)$ $K \to 2\pi$ amplitude. With a simple vacuum-saturation model of the $\Delta I = (3/2)$ $K \to 2\pi$ amplitude the observed relative sign of the $\Delta I = (1/2)$ and $\Delta I = (3/2)$ amplitudes is also correctly obtained.

24628 **Analysis of preon models with a small number of flavors.** Rizzo, T.G. (Ames Laboratory and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 272-284(1 Jan 1983).

We analyze a large number of four- and five-preon models along with several six-preon models. By imposing constraints such as cancellation of anomalies and reproduction of the usual quarks and leptons as composites we are able to eliminate many of these from further consideration. If we try to embed the electroweak interactions into the flavor group G/sub PF/, we are left with a single, five-preon model. The remaining model is inconsistent with grand unification and asymptotic freedom. We conclude that the simplest preon model must have at least six flavors and contain a single 3/sub C/ and three 1/sub C/'s.

24629 **Quantum chromodynamics and the helicity structure of psi$\to\gamma 2^{++}$.** Close, F.E. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 311-312(1 Jan 1983). Contract AC03-76SF00515.

The helicity structure of psi$\to\gamma f$ disagrees with a QCD model prediction by 4σ. An empirical rule that yields the data precisely is noted in the hope of elucidating the dynamics. The importance of psi$\to\gamma\theta$ and $\Upsilon\to\gamma f$ helicity measurements is stressed.

6453 Particle Invariance Principles And Symmetries

REFER ALSO TO CITATION(S) 24632

24630 **(BONN-HE—82-13) Relations between irreducible representations of the hyperoctahedral group and O(4) and SO(4).** Baake, M.; Gemuenden, B.; Oedingen, R. (Bonn Univ. (Germany, F.R.). Physikalisches Inst.). Jun 1982. 12p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750138.

In this paper we describe the relations between the irreducible representations of the hyperoctahedral group in four dimensions and irreducible, low dimensional representations of the orthogonal groups, O(4) and SO(4).

6454 Field Theory

REFER ALSO TO CITATION(S) 24629

24631 **(DOE/ER/70004—297) Status of theories of CP non-invariance.** Deshpande, N.G. (Oregon Univ., Eugene (USA). Inst. of Theoretical Science). 1981. Contract AT06-76ER70004. 8p. NTIS, PC A02. Order Number DE82008303.

Paper copy only, copy does not permit microfiche production.

Different gauge models of CP nonconservation are reviewed. When both experimental constraints like the value of epsilon'/epsilon and theoretical constraints like grandunification are imposed, Kobayashi-Maskawa model seems the most acceptable theory. We also review the strong CP problem.

24632 **Spontaneous breaking of global B-L symmetry and matter-antimatter oscillations in grand unified theories.** Mohapatra, R.N.; Senjanovic, G. (Physics Department, The City College of the City University of New York, New York, New York 10031). *Physical Review* [*Section*] *D: Particles and Fields;* **27**: No. 1, 254-263(1 Jan 1983).

We explore the consequences of the hypothesis that B-L symmetry, which is exact in the standard model based on the SU(2)/sub L/ x U(1) x SU(3)/sub c/ gauge group and its extension to the minimal SU(5) theory, is a spontaneously broken global symmetry. This results in possibly observable rates for $\Delta(B\text{-}L) = 0$, $\Delta B = 2$ hydrogen-antihydrogen transitions and double proton decay $pp \to e^+e^+$ ($\mu^+\mu^+$) and $\Delta(B\text{-}l) \neq 0$, $\Delta B = 2$ neutron-antineutron mixing and $p+n \to \pi$'s; furthermore, a relation between the transition times tau/sub HhyphenH/, tau/sub n/-n-bar, Majorana neutrino mass, and the mass of a doubly charged Higgs particle Δ^{++} emerges. At the level of SU(2)/sub L/ x U(1) x SU(3)/sub c/, for tau/sub n/-n-bar$\approx 10^7$ sec and m++$\approx$20 GeV, we predict tau/sub HhyphenH/$\approx 10^3$ yr and tau/sub p/p$\approx 10^{31}$ yr, both of which are experimentally testable numbers. The embedding of our model in SU(5) is discussed in detail, with the analysis of tau/sub p/ and $\sin^2\theta$/sub W/ besides matter oscillations.

24633 **Finite element approximation in quantum field theory.** Bender, C.M. (Washington Univ., St. Louis, MO (USA). Dept. of Physics); Guralnik, G.S. (Brown Univ., Providence, RI (USA). Dept. of Physics); Sharp, D.H. (Los Alamos National Lab., NM (USA). Theoretical Div.). *Nuclear Physics [Section] B;* **207**: No. 1, 54-76(1 Nov 1982).

Lattices are conventionally used to regulate quantum field theory. However, lattices have a number of drawbacks, one of the most noteworthy being the awkwardness which arises in treating the first difference operator associated with the fermion kinetic energy. We propose here an alternative to the conventional lattice formulation of quantum field theories. This alternative is based on the method of finite elements, which has been a powerful tool in continuum mechanics and fluid dynamics for many years. We believe that this method may be advantageous in quantum field theory because it treats bosons and fermions on a nearly equal footing. This is possible because in the finite element method one does not introduce a finite difference approximation for derivatives. In this paper, we adapt the finite element technique to quantum field theory, and apply it to several elementary field theory models.

24634 **Analysis of the lattice, strong coupling series for $g_0$phi^4 field theory in d dimensions.** Baker, G.A. Jr.; Benofy, L.P.; Cooper, F.; Preston, D. (Los Alamos National Lab., NM (USA). Theoretical Div.). *Nuclear Physics [Section] B;* **210**: No. 3, 273-288(25 Oct 1982).

We analyze the renormalized strong coupling series for lattice g_0PHI^4 field theory which is a double series in $x = M^4a^4/g_0$sup(4-d) and $y = 1/M^2a^2$, where M is the renormalized mass, a the lattice spacing, g_0 the bare coupling constant and d the dimension of space-time. We extrapolate to large y for fixed x by using a Pade-like extrapolation technique. We study the dimensionless renormalized coupling constant G/Msup(4-d) and find that as we approach the continuum ($x \to 0$, $y \to$ infinity) the entire spectrum of g_0 from zero to infinity can be studied. Our results for d = 1, 2, 3, 4 based on a series in y up to y^5 and in x up to x^5 show that for fixed lattice spacing a, G/Msup(4-d) is a monotonic function of g_0 ranging from zero at $g_0 = 0$ to a maximum at $g_0 =$ infinity. Using the high temperature expansion results, we have also derived 9 terms in y on 8 lattices of dimension 1, 2, 3 and 4 for the linear term in x, and studied this series to see if one can see a breakdown in this monotonic behavior of G for large y. The analysis of this latter series is inconclusive.

24635 **U(3) four-dimensional lattice gauge theory and Monte Carlo calculations.** Creutz, M. (Brookhaven National Lab., Upton, NY (USA)); Moriarty, K.J.M. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.); Royal Holloway Coll., Englefield Green (UK). Dept. of Mathematics). *Nuclear Physics [Section] B;* **210**: No. 3, 377-387(25 Oct 1982).

Monte Carlo results for the pure U(3) lattice gauge theory on a 6^4 lattice are reported. Wilson loops and the string tension are presented. The first-order phase transition in U(3) is reflected quite clearly in a discontinuity in the string tension at $\beta = \beta$sub(c). The U(1) factor of U(3) is extracted using the determinant of the Wilson loops. As expected, the U(1) component appears to deconfine at the phase transition.

24636 **Lorentz-non-invariant counter-terms in QCD in a general axial gauge.** Leibbrandt, G.; Matsuki, T. (Guelph Univ., Ontario (Canada). Dept. of Mathematics and Statistics); Okawa, M. (Brookhaven National Lab., Upton, NY (USA)). *Nuclear Physics [Section] B;* **206**: No. 3, 380-386(18 Oct 1982).

It is shown in the context of a pure Yang-Mills theory that the solution of the Slavnov-Taylor identities in a general axial gauge admits counter-terms which may or may not be Lorentz invariant. It follows from the background field method that these counter-terms must be gauge invariant. The Lorentz-non-invariant counter-terms appear already at the one-loop level and depend both on the gauge parameter α and the non-covariant vector nsub(μ).

6455 Scattering Theory

24637 **(DOE/ER/70004—290) Polarization structure of reactions at theta/sub C.M./ = π/2.** Goldstein, G.R.; Moravcsik, M.J. (Oregon Univ., Eugene (USA). Inst. of Theoretical Science; Tufts Univ., Medford, MA (USA). Dept. of Physics). Aug 1981. Contract AT06-76ER70004. 18p. NTIS, PC A02. Order Number DE82008308.

Paper copy only, copy does not permit microfiche production.

The polarization structure of a reaction of particles with arbitrary spins is described at 90° for the case when one or several pairs of identical particles form the reaction. The simplification of the structure is described in the optimal formalism, and particularly in the helicity and transversity frames, and the reduction in the number of independent amplitudes is tabulated for arbitrary spins and for a large assortment of combinations of symmetries. The constraints due to only one pair of identical particles are particularly stressed since these have hardly been utilized in the past. The results are illustrated on elastic proton-proton scattering, and data for this reaction at 800 MeV are analyzed at 90° both phenomenologically and with a specific aim of testing suggestions for the existence of dibaryon resonances. It is shown that at 800 MeV and 90° the proton-proton scattering data are compatible with a resonance of the type that has been suggested, though the data do not demand such a resonance.

24638 **Scattering theory in arrangement channel quantum mechanics.** Evans, J.W.; Hoffman, D.K.; Kouri, D.J. (Ames Laboratory and Department of Chemistry, Iowa State University, Ames, Iowa 50011). *Journal of Mathematical Physics (New York);* **24**: No. 3, 576-587(Mar 1983). Contract W-7405-ENG-82.

The time-independent scattering theory associated with the non-self-adjoint matrix Hamiltonians H of arrangement channel quantum mechanics is presented in detail first using the 3-particle case as an example. A key feature is the biorthogonality of a suitably constructed set of scattering eigenvectors and duals. Channel space Moeller operators, S- and T-matrices are defined and a variety of properties investigated including the way multichannel unitarity is embedded into the theory. Some remarks on the time-dependent theory are also made. A detailed discussion of channel space density matrix scattering theory (of interest, e.g., in reactive kinetic theory) is presented using the Liouville representation. We describe some special cases including the exclusion of breakup and 2 x 2 choices of three particle H.

65 PHYSICS RESEARCH

6510 Nuclear Physics

24639 **(ANL/NESC—815) ALVIN; differential-integral data consistency.** Harris, D.R. (Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Nuclear Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048815.

Reference report, LA05987.

ALVIN analyzes the consistency of a set of differential and integral nuclear data, adjusts the differential nuclear data to improve agreement with integral observations, and identifies inconsistent data. ALVIN also computes required sensitivities and related quantities such as sensitivity profiles.CDC7600; FORTRAN IV; SCOPE; 55,000 (octal) words of small core memory (SCM) and 303,000 (octal) words of large core memory (LCM) are required to execute the program.

24640 **(ANL/NESC—830) HAUSER5; nuclear reaction cross sections.** Mann, F.M. (Hanford Engineering Development Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048830.

HAUSER5 can accurately predict nuclear cross sections over most energy ranges less than about 60 MeV. A maximum of six reaction pairs can be calculated. Residual nucleii can be described by 100 discrete levels and by the constant temperature level formula and/or the Fermi-gas level description. Reference report, HEDL-TME-78-83, and NESC Note 80-04.

HAUSER5 calculates angle-integrated and, if desired, angle-differential reaction cross sections which can include capture and fission channels. Cross sections for discrete particle channels can be calculated, as well as the total for each reaction pair. Tertiary reactions can be calculated as though the reaction occurs as two sequential binary reactions. There is no restriction on the spins of the particles.UNIVAC1100/44; FORTRAN V; EXEC8; Input device (logical unit 5) to read card images, output devices for printed copy (units 6, 8, 10, and 11), and output devices for punched cards (units 7 and 9). HAUSER5, when overlayed, requires 58K words of memory. The auxiliary program, TISO, requires punch units 7 and 8 and 17K words of memory.

24641 **(DOE/ER/10407—3) Theoretical nuclear reaction and structure studies using kaons and photons. Progress report, 1 February 1982-31 January 1983.** Cotanch, S.R. (North Carolina State Univ., Raleigh (USA). Dept. of Physics). 1983. Contract AS05-79ER10407. 5p. NTIS, PC A02/MF A01. Order Number DE83008800.

Research progress and results obtained are reported on kaon photoproduction and hypernuclear excitation studies and particle radiative capture studies. (WHK)

24642 **(HMI—373) Scientific progress report 1981.** (Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.). Bereich Kern- und Strahlenphysik). 1982. 195p. (In German and English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Individual items from the report were prepared separately for the data base. (GHT)

24643 **(NEANDC(J)—89/U) Prediction of mass excess, β-decay energy and neutron separation energy from the atomic mass formula with empirical shell terms.** Ando, Y.; Uno, M.; Yamada, M. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Japanese Nuclear Data Committee). Feb 1983. 147p. (INDC(JAP)—76/L; JAERI-M—83-025). Japan Atomic Energy Research Inst., Div. of Technical Information, Tokai-mura, Ibaraki-ken. Order Number DE83901996.

Recently we proposed two types of atomic mass formula (constant-shell-term formula, linear-shell-term formula). With use of these formulas, we calculate and tabulate mass excesses, neutron separation energies, and β-decay energies (β^--decay and/or electron capture) for about 5000 nuclides. The mass excess values and their errors in the 1977 atomic mass evaluation by A.H. Wapstra and K. Bos which we used in constructing our formulas, are also tabulated for reference. The constant-shell-term formula is fitted to 1468 input mass data with the standard deviation of 626 keV and the linear-shell-term formula with 394 keV.

6513 Nuclear Properties And Reactions, A=6-19

24644 **(CONF-820357—8) 0^- to 0^+ beta decay in A = 16.** Gagliardi, C.; Garvey, G.T.; Wrobel, J.R.; Freedman, S.J. (Argonne National Lab., IL (USA); Stanford Univ., CA (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83008664.

From International conference on spin excitations in nuclei; Telluride, CO, USA (25 Mar 1982).

Portions are illegible in microfiche products.

Techniques and results of the measurement of the beta-decay rate of the first excited state of ^{16}N to the ground state of ^{16}O are reported. Energy levels involved in the decay are shown, and the ^{16}N 0^- beta decay branching ration is given. (WHK)

24645 (HMI—373, pp 27) **Reaction model for the description of spin-flip in the inelastic scattering of $^{13}C + ^{12}C \rightarrow ^{13}C' + ^{12}C^*(2^+)$.** Liu, Q.K.K.; Imanishi, B.; Baymen, B.; Chakravati, S.; Ellis, P.J. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24646 (HMI—373, pp 27-28) **Microscopic calculations of the transition probability and E2 form factor of ^{7}Li and ^{7}Be.** Liu, Q.K.K.; Tang, Y.C. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24647 (HMI—373, pp 44-45) **Observation of the nuclear rainbow scattering in the $^{12}C + ^{12}C$ system at 300 MeV.** Bohlen, H.G.; Clover, M.R.; Ingold, G.; Lettau, H.; von Oertzen, W. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24648 (HMI—373, pp 46) **Energy dependence of the total reaction cross section of the system $^{12}C + ^{12}C$.** Bohlen, H.G.; Clover, M.R.; Lettau, H.; von Oertzen, W. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24649 (HMI—373, pp 47-48) **Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution.** Lettau, H.; Rossner, H.; Bohlen, H.G.; von Oertzen, W. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24650 (LA—8775-C, pp 256-266) **Evidence against clusters in ^{12}C nuclei and against the $^1D_2$ 2140 dibaryon resonance.** Ellis, R.J. (Univ. of Virginia, Charlottesville); Ziock, H.J.; Ziock, K.O.H. Mar 1981. NTIS, PC A25/MF A01. Order Number DE83006219.

From Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference; Los Alamos, NM, USA (5 Jan 1981).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

We have made coincidence measurements of the reaction $^{12}C(\pi^+, \pi^+ d)\ ^{10}B$ using a high resolution double-arm spectrometer system. We present angle and momentum distributions for incident energies in the range 160 to 200 MeV. We have made fits to these distributions using a plane wave two-step knock-out reaction model. We find the data is fitted best by the PWIA model with a chi^2/DF of 1.7, assuming systematic errors of 15%. The cluster, which forms the deuteron in this model, arises naturally from the overlap of the standard proton and neutron P-state shell model wave functions. With the proviso that distortions are not included in these calculations, we find no evidence for clustering within the ^{12}C nucleus, other than that which is predicted by the shell model. We have also extracted the π-d elastic differential cross-section as a function of the π-d invariant mass. It shows a peak near 2125 MeV with a width of about 50 MeV FWHM, which could be associated with the supposed $^1D_2$ B^2 (2140) dibaryon resonance. Our calculations show that this is probably a manifestation of the (3,3) resonance, and so we find no evidence to support the B^2 (2140).

6514 Nuclear Properties And Reactions, A=20-38

REFER ALSO TO CITATION(S) 24649

24651 **(CONF-8110242—3) Resonances in s-d shell nuclei.** Schiffer, J.P. (Argonne National Lab., IL (USA); Chicago Univ., IL (USA)). 1981. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83008698.

From International workshop on resonances in heavy ion collisions; Bad Honnef, F.R. Germany (12 Oct 1981).

Portions are illegible in microfiche products.

It appears that the system we have studied here, $^{24}Mg(^{16}O,^{12}C)^{28}Si$ representing ^{40}Ca as the composite nucleus, is perhaps the heaviest one that exhibits strong enough resonances that quantitative measurements may be contemplated. But we have uncovered only a small corner of what is there and even within this system a huge amount of work remains. The nature of these resonances is not yet clear. The sequence may perhaps have an explanation that is schematically outlined, namely that there are several families of quasistationary states in ^{40}Ca, but that the slopes of these families do not necessarily coincide with the slope of the grazing partial waves that provide us with a narrow transparent strip of a window on the underlying structure of the nucleus. We must concentrate a lot of effort and ingenuity in order to maximize the information we gather through this window and only then may we hope to sensibly attempt forming hypotheses about the underlying simple pattern.

24652 (HMI—373, pp 26) **Reaction model for the description of spin-flip in the inelastic scattering of $^{13}C + ^{24}Mg \rightarrow ^{13}C' + ^{24}Mg^*(2^+)$.** Liu, Q.K.K.; Baymen, B.; Chakravati, S.; Ellis, P.J. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24653 (HMI—373, pp 52-53) **Balance between light-fragment and fission inclusive cross sections of the $^{20}Ne + ^{197}Au$ reaction between 7.5 and 20 MeV/nucleon.** Egelhaaf, C.; Homeyer, H.; Bohlen, G.; Fuchs, H.; Gamp, A.; Kluge, H. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24654 (HMI—373, pp 141) **Spin polarization in $^{20}Ne + ^{168}Er$ collisions at 13.5 MeV/N.** Duennweber, W.; Hering, W.; Ritzka, R.; Trautmann, W.; Trombik, W.; Egelhaaf, C.; Homeyer, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

6515 Nuclear Properties And Reactions, A=39-58

REFER ALSO TO CITATION(S) 24649, 24651, 24673

24655 (HMI—373, pp 21-22) **Error propagation in fitting optical potentials to elastic heavy-ion scattering.** Krappe, H.J.; Rossner, H.H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24656 (HMI—373, pp 23) **Error propagation in the phase analysis of elastic scattering data.** Krappe, H.J.; Rossner, H.H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24657 (HMI—373, pp 42-43) **Excitation of the giant quadrupole resonance in ^{58}Ni by 40 MeV ^{20}Ne.** Bohlen, H.G.; Lettau, H.; von Oertzen, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24658 (HMI—373, pp 49) **Search for giant resonance charge exchange modes using the ($^{13}C,^{13}N$) reaction.** Flynn, E.R.; Bohlen, H.G.; Fick, D.; Lettau, H.; Miczaika, A.; von Oertzen, W.; Ulrich, R.; Weller, W. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24659 (HMI—373, pp 51) **Study of inelastic and single-neutron transfer reactions induced by 14.5 MeV/A ^{20}Ne ions on ^{40}Ca.** Kovar, D.G.; Bohlen, H.G.; Buergel, M.; Egelhaaf, C.; Fuchs, H.; Gamp, A.; Grabisch, K.; Homeyer, H.; Lettau, H.; Rauch, W. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24660 (HMI—373, pp 56) **Dissociation of ^{20}Ne in collisions with ^{40}Ca at 14.5 MeV/nucleon.** Rauch, W.; Homeyer, H.; Buergel, M.; Egelhaaf, C.; Fuchs, H.; Gamp, A.; Kovar, D. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24661 (HMI—373, pp 69) **Study of $^{20}Ne + ^{40}Ca$ at Esub(lab)/A = 14.5 MeV.** Kovar, D.G.; Bohne, W.; Buergel, M.; Egelhaaf, C.; Fuchs, H.; Gamp, A.; Grabisch, K.; Hilscher, D.; Homeyer, H.; Morgenstern, H. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24662 (HMI—373, pp 70-71) **Incomplete momentum transfer in fusion reactions.** Morgenstern, H.; Bohne, W.; Grabisch, K.; Kovar, D.; Kyanowski, A.; Lehr, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24663 (HMI—373, pp 73-74) **Measurement of evaporation residues from the system $^{40}Ar + ^{40}Ca$.** Bohne, W.; Brendel, C.; Carter, J.; Feldmeier, H.; Grabisch, K.; Lehr, H.; Morgenstern, H.; Richter, A.; Schrieder, G. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24664 (HMI—373, pp 75-76) **Global increase of near- and below-barrier fusion for heavier systems.** Jahnke, U.; Rossner, H.H.; Hilscher, D.; Holub, E. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24665 (HMI—373, pp 142) **^{43}K, a new probe for the system KFe.** Bergmeister, F.J.; Lieb, K.P.; Uhrmacher, M.; Grawe, H.; Haas, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24666 (HMI—373, pp 143) **Light particle emission from the reaction of ^{12}C with ^{58}Ni and ^{197}Au at 25 MeV per nucleon.** Gaul, G.; Gebauer, B.; Glasow, R.; Ludewigt, B.; Santo, R. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

6516 Nuclear Properties And Reactions, A=59-89

REFER ALSO TO CITATION(S) 24664

24667 (HMI—373, pp 17) **Role of deformation and shell effects in deep inelastic collisions of ^{86}Kr + ^{88}Sr,^{90}Zr,^{92}Mo at energies close to the Coulomb barrier.** Froebrich, P.; Strack, B.; Siekmann, H.; Gebauer, B.; Bohlen, H.G.; Kluge, H.; von Oertzen, W.; Hildebrand, K.D.; Sann, H.; Lynen, U. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24668 (HMI—373, pp 72) **Measurement of coincidences between evaporation residues and fast light particles.** Lehr, H.; Kohlmeyer, B.; Bohne, W.; Grabisch, K.; Morgenstern, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24669 (HMI—373, pp 89-90) **Gamma ray spectroscopy in ^{78}Sr and ^{82}Zr.** Grawe, H.; Haas, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24670 (HMI—373, pp 90) **Halflife and decay of ^{78}Sr.** Grawe, H.; Haas, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

6517 Nuclear Properties And Reactions, A=90-149

REFER ALSO TO CITATION(S) 24640, 24643, 24643, 24664, 24667, 24704

24671 (ANL/NESC—757) **GNASH; particle induced cross-sections & spectra.** Young, P.G.; Arthur, E.D. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048757.

The program can handle the decay of up to 10 compound nuclei, each emitting 6 types of radiation. For each nucleus, up to 200 energy bins and 50 discrete levels can be used. A maximum spin of 20 is allowed.

The preequilibrium, statistical nuclear model code GNASH calculates reaction and level cross sections, isomer ratios, and spectra (neutron, gamma-ray, and charged-particle) resulting from particle-induced reactions using the Hauser-Feshbach formalism along with simple preequilibrium corrections. Gamma-ray competition is considered in detail for every decaying compound nucleus.CDC7600; FORTRAN and COMPASS; SCOPE; 49K words of small core memory (SCM) and at least 80K words of large core memory (LCM) for problems of reasonable size. The sample problem uses 134K of SCM and 140K of LCM.

24672 (CONF-821143—6) **Role of M1 transitions in the quasicontinuum.** Chen, Y.S.; Leander, G.A. (Tennessee Univ., Knoxville (USA). Dept. of Physics; Oak Ridge Associated Universities, Inc., TN (USA)). 1982. Contract AS05-76ER04936. 12p. NTIS, PC A02/MF A01. Order Number DE83008189.

From High angular momentum properties of nuclei conference; Oak Ridge, TN, USA (2 Nov 1982).

M1 transition rates are strongly structure dependent and may therefore reveal the structure in a quasicontinuum of nuclear excited states. The theoretical interpretations of low-energy stretched dipole bumps are briefly reviewed. Furthermore, it is suggested that there are higher-energy M1 bumps with a signficant unstretched component, and that the related shell effects influence the cooling which feeds the yrast cascade.

24673 (HMI—373, pp 14) **No need for a new damping mechanism in the system ^{133}Xe + ^{56}Fe at energies below 7.12 MeV/ν.** Froebrich, P.; Gross, D.H.E. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24674 (HMI—373, pp 50) **Neutron pair transfer between tin isotopes.** von Oertzen, W.; Gebauer, B.; Gamp, A.; Bohlen, H.G.; Busch, F.; Schuell, D. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24675 (HMI—373, pp 64-65) **Charge equilibration in the deep-inelastic reactions ^{40}Ar + ^{100}Mo and ^{36}Ar + ^{92}Mo.** Bohne, W.; Grabisch, K.; Mogenstern, H.; Stoeffler, W. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24676 (HMI—373, pp 91-92) **Lifetime measurements and quadrupole moments in sup(123,125)Xe.** Alber, D.; Grawe, H.; Hass, H.; Mahnke, H.E.; Semmler, W.; Sielemann, R.; Zeitz, W.D. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24677 (HMI—373, pp 93) **Quadrupole moment of the 7^- isomer in ^{143}Sm.** Berger, A.; Grawe, H.; Mahnke, H.E.; Semmler, W.; Sielemann, R. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24678 (HMI—373, pp 98) **Observation of giant dipole resonances built on states of high energy.** Lindenberger, K.H.; Newton, I.O.; Herskind, B.; Diamond, R.M.; Dines, E.L.; Draper, I.E.; Schueck, C.; Shi, S.; Stephens, F.S. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24679 (HMI—373, pp 144) **Atomic masses of rare-earth isotopes.** Kantus, R.; Runts, E.; Schmidt-Ott, W.D.; Schrewe, U.J.; Tidemand-Petersson, P.; Michaelsen, R. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24680 **Los Alamos: nuclear monopole.** *CERN Courier;* 22: No. 9, 361-362(Nov 1982).

Published in summary form only.

6518 Nuclear Properties And Reactions, A=150-189

REFER ALSO TO CITATION(S) 24654, 24678

24681 (CONF-820738—6) **Shell structure at high spin and the influence on nuclear shapes.** Khoo, T.L.; Chowdhury, P.; Ahmad, I. (Argonne National Lab., IL (USA); Purdue Univ., Lafayette, IN (USA)). 1982. Contract W-31-109-ENG-38. 19p. NTIS MF A01. Order Number DE83008504.

From INS symposium on dynamics of nuclear collective motion; Mount Fuji, Japan (6 Jul 1982).

Microfiche only, copy does not permit paper copy reproduction.

Nuclear structure at high spin is influenced by a combination of liquid-drop and shell-structure effects. For N < 86 both contribute towards the occurrence along the yrast line of high-spin oblate aligned-particle configurations. Shell effects are mainly responsible for the prolate deformation of nuclei with N > 90. The competition between oblate and prolate driving effects leads to a prolate-to-oblate shape transition in $^{154}Dy_{88}$. The role of rotation-aligned configurations in the shape change is discussed.

24682 (HMI—373, pp 16) **Dynamical coupling of relative motion, deformations and charge transfer within a Fokker-Planck equation for deep inleastic collisions.** Froebrich, P.; Strack, B.; Durand, M. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24683 (HMI—373, pp 25) **Calculation of reaction cross sections for deformed nuclei.** Lipperheide, R.; Rossner, H. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24684 (HMI—373, pp 61-63) **Neutron emission in the reaction $^{165}Ho + ^{20}Ne$.** Hilscher, D.; Holub, E.; Ingold, G.; Jahnke, U.; Orf, H.; Rossner, H. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24685 (HMI—373, pp 66-67) **Emission of light charged particles in the reaction $^{165}Ho + ^{56}Fe$.** Wilcke, W.W.; Birkelund, J.R.; Butler, M.; Hilscher, D.; Hoover, A.D.; Huizenga, J.R.; Kosky, J.P.; Schroeder, W.U.; Wollersheim, H.J. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24686 (HMI—373, pp 145) **Fission fragment angular correlation in 300 MeV ^{20}Ne induced reactions on heavy targets.** Birkelund, J.R.; Tubbs, L.E.; Hilscher, D.; Gebauer, B.; Lettau, H.; Jahnke, U.; Rossner, H.; Huizenga, J.R. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24687 (HMI—373, pp 148) **Complete fusion in the system $^{146}Nd + ^{16}O$ at 10 MeV/N.** Bohne, W.; Freiesleben, H.; Grabisch, K.; Hildebrand, K.D.; Kollatz, M.; Lehr, H.; Oeschler, H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24688 (HMI—373, pp 150) **Observation of a decrease in the g-factors of sup(156,160)Gd at high spins.** Graef, H.; Haeusser, O.; Grawe, H.; Mahnke, H.E.; Semmler, W.; Rud, N.; Kleinonen, J. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24689 (HMI—373, pp 151) **High-spin rotational states in ^{166}Hf and ^{170}W.** Agarwal, Y.K.; Decman, D.J.; Guttormsen, M.; Huebel, H.; Kluge, H.; Maier, K.H.; Recht, J. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24690 **Bombarding energy dependence of angular momentum transfer in deep inelastic collisions.** Christensen, P.R.; Hansen, O.; Nathan, O.; Videbaek, F. (Niels Bohr Inst., Copenhagen (Denmark)); Freiesleben, H. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)); Britt, H.C. (Los Alamos National Lab., NM (USA)); van der Werf, S.Y. (Rijksuniversiteit Groningen (Netherlands). Kernfysisch Versneller Inst.). *Nuclear Physics [Section] A;* **390**: No. 2, 336-350(6 Dec 1982).

Measurements of first and second moments of γ-ray multiplicity distributions from deep inelastic collisions of $^{86}Kr + ^{154}Sm$ are reported. A global systematics of the angular momentum distributions from deep inelastic reactions with projectile masses approx. >= 40 is presented. The average angular momentum is found to depend linearly on the incident channel average angular momentum, while no simple systematics for the second moment appears obvious. In order to illuminate the question whether the angular momentum transfer process reaches statistical equilibrium in deep inelastic collisions, numerical calculations have been performed on two models: a two-sphere classical model including the collective modes of twisting, bending, wriggling and tilting, and a statistical equilibrium Fermi-gas model. The two-sphere classical model is not able to account for the observed second moments, and neither does the Fermi-gas model give an explanation of the deep inelastic multiplicity data.

6519 Nuclear Properties And Reactions, A=190-219

REFER ALSO TO CITATION(S) 24649, 24653, 24666, 24686

24691 (HMI—373, pp 15) **Mass-yield distribution in proton and heavy-ion induced target fragmentation processes.** Gross, D.H.E.; Satpathy, L.; Meng Ta Chung. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24692 (HMI—373, pp 40-41) **Spin orbit interaction of ^{13}C and ^{11}B.** von Oertzen, W.; Lettau, H.; Bohlen, H.G.; Fick, D.; Ulrich, R. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24693 (HMI—373, pp 54-55) **Dissociation of 15 MeV/nucleon ^{20}Ne in collisions with ^{197}Au: direct reactions leading to particle-emitting states.** Buergel, M.; Clover, M.; Egelhaaf, C.; Fuchs, H.; Gamp, A.; Homeyer, H.; Kovar, D.; Rauch, W. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24694 (HMI—373, pp 58) **Evidence for non-sequential emission of fast α-particles in deep-inelastic $^{20}Ne + ^{197}Au$ collisions at 14.5 MeV/nucleon.** Homeyer, H.; Buergel, M.; Egelhaaf, C.; Fuchs, H.; Gamp, A.; Rauch, W.; Clover, M. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24695 (HMI—373, pp 59-60) **Indication of preequilibrium emission in deep inelastic Ar + Au collisions.** Gamp, A.; Buergel, M.; Clover, M.; Egelhaaf, C.; Fuchs, H.; Gebauer, B.; Homeyer, H.; Jacmart, J.C.; Rauch, W. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24696 (HMI—373, pp 68) **Search for 'fast fission' at the system $^{20}Ne + ^{197}Au$.** Buergel, M.; Egelhaaf, C.; Fuchs, H.; Gamp, A.; Homeyer, H. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24697 (HMI—373, pp 94) **G-factor of the 12^+ isomer in ^{192}Pb.** Stenzel, C.; Grawe, H.; Haas, H.; Mahnke, H.E.; Maier, K.H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24698 (HMI—373, pp 95) **Spectroscopy of ^{215}Ac and systematics of the N = 126 isotones.** Decman, D.J.; Grawe, H.; Kluge, H.; Maier, K.H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24699 (HMI—373, pp 96-97) **Perturbed angular distribution in the α-decay; g-factor measurements and spectroscopy of ^{217}Ac.** Decman, D.J.; Grawe, H.; Kluge, H.; Maier, K.H. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24700 (HMI—373, pp 149) **Light charged-particle emission from $^{197}Au + ^{20}Ne$.** Machner, H.; Riepe, G.; Protic, D.; Bohlen, H.G.; Fuchs, G. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.
Published in summary form only.
In Scientific progress report 1981.

24701 **^{12}C and ^{8}Be production in $^{12}C + ^{208}Pb$ collisions.** Bice, A.N.; Shotter, A.C.; Cerny, J. (California Univ., Berkeley (USA). Dept. of Chemistry; California Univ., Berkeley (USA). Lawrence Berkeley Lab.). *Nuclear Physics [Section] A;* 390: No. 1, 161-188(29 Nov 1982).
With 34 refs.
The mechanisms involved in the production of fast α-particles in ^{12}C-induced reactions have been studied for the $^{12}C + ^{208}Pb$ system at the bombarding energies of Esub(12sub(C)) = 132, 187 and 230 MeV. Absolute cross sections for the reactions $^{208}Pb(^{12}C, ^{12}Csup(*) \rightarrow \alpha + ^{8}Be)$, $^{208}Pb(^{12}C, ^{8}Be(g.s.))$ and $^{208}Pb(^{12}C, ^{8}Be(2.94\ MeV))$ have been determined by coincidence measurement of two or three correlated α-particles. Inclusive α-particle production cross sections were also measured at Esub(12sub(C)) = 187 MeV. It is found that the inelastic process $(^{12}C, ^{12}Csup(*) \rightarrow \alpha + ^{8}Be)$ does not contribute significantly to fast α-particle production but that the production of ^{8}Be by projectile fragmentation is an important source of α-particles. At the highest bombarding energy (230 MeV) it appears that the $^{12}C \rightarrow 3\alpha$ fragmentation reaction becomes more prominent at the expense of the $^{12}C \rightarrow \alpha + ^{8}Be$ fragmentation channel.

6520 Nuclear Properties And Reactions, A=220 And Above

REFER ALSO TO CITATION(S) 24686

24702 **(ANL/NESC—805) DOPSEL; self-shielding in the resonance region.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Singh, R.S. (Reactor Research Centre, Kalpakkam (India)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048805.
Twenty resonances on either side of the reference resonance are tested for inclusion in the overlap effect, and the following assumptions are made: the velocity of the target nucleus is small compared to the neutron velocity, the partial widths are independent of energy, and the nuclei have a Maxwellian velocity distribution. Reference report, RRC-6, and Atomkernenergie Bd. 27 reprint.
DOPSEL evaluates the temperature- and composition-dependent self-shielded cross-sections and self-shielding factors for neutron capture, fission, and scattering processes in both resolved and unresolved regions. The generalized resonance integrals under the NR approximation for both fissile and fertile materials and infinite dilution cross sections are also calculated.IBM370; FORTRAN IV; OS/370 MVT; 250K bytes of memory.

6530 Nuclear Theory

REFER ALSO TO CITATION(S) 24612, 24616, 24643, 24655, 24656, 24681

24703 **(CONF-810107—7) Nuclear forces and nuclear matter including pions and isobars.** Coester, F. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008525.
From 2. international conference on recent progress in many-body theories; Mexico City, Mexico (12 Jan 1981).
Portions are illegible in microfiche products.
Conventional nuclear theory is based on the rather successful model which stipulates that nuclei consist of nucleons with two-body interactions. Extensive use of pion beams as probes of nuclear structure suggests a minimal extension of this model to include pion degrees of freedom explicitly in a manner which allows production and absorption of pions without dressing isolated nucleons with a pion cloud. Some properties of such models are discussed. The parameters of the models are fitted to properties of the pion-nucleon and nucleon-nucleon systems. The nucleon is endowed with a 3/2 3/2 excited state, the Δ isobar, which can decay by pion emission. The pion-nucleon interaction consists of two-body potentials in addition to the Δ-decay interaction which provides the mechanism for pion production and absorption. There is no πNN vertex in the Hamiltonian and therefore no pion cloud attached to a single nucleon.

24704 **(CONF-821143—5) High spins in gamma-soft nuclei.** Leander, G.A.; Frauendorf, S.; May, F.R. (Oak Ridge Associated Universities, Inc., TN (USA); Tennessee Univ., Knoxville (USA); Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)). 1982. Contract AS05-76ER04936. 25p. NTIS, PC A02/MF A01. Order Number DE83008190.
From High angular momentum properties of nuclei conference; Oak Ridge, TN, USA (2 Nov 1982).
Nuclei which are soft with respect to the γ shape degree of freedom are expected to have many different structures coexisting in the near-yrast regime. In particular, the lowest rotational quasiparticle in a high-j shell exerts a strong polarizing effect on γ. The γ to which it drives is found to vary smoothly over a 180° range as the position of the Fermi level varies. This simple rule is seen to have a direct connection with the energy staggering of alternate spin states in rotational bands. A diagram is presented which provides a general theoretical reference for experimental tests of the relation between γ, spin staggering, configuration, and nucleon number. In a quasicontinuum spectrum, the coexistence of different

structures are expected to make several unrelated features appear within any one slice of sum energy and multiplicity. However, it is also seen that the in-band moment of inertia may be similar for many bands of different γ.

24705 **(GSI—82-4) Are there superheavy atomic nuclei.** Herrmann, G. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)). Apr 1982. 34p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750132.

Lecture delivered on the 19th of December 1981 as part of a series entitled 'University in the town hall' organized by Mainz Univ.

The author presents a popular introduction to the formation of nuclei with special regards to superheavy nuclei. After a general description of the methods of physics the atomic hypothesis is considered. Thereafter the structure of the nucleus is discussed, and the different isotopes are considered. Then radioactivity is described as an element transmutation. Thereafter the thermonuclear reactions in the sun are considered. Then the synthesis of elements using heavy ion reactions is described. In this connection the transuranium elements and the superheavy elements are considered.

24706 (HMI—373, pp 11) **Surface friction model of deep inelastic collisions and capture.** Gross, D.H.E.; Satpathy, L. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24707 (HMI—373, pp 12) **Cluster transfer in damped collisions between heavy ions.** Gross, D.H.E.; Hartmann, K.M. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24708 (HMI—373, pp 13) **Interplay between coherent and stochastic effects in deep inelastic collisions of heavy ions.** Gross, D.H.E.; Moehring, K.; Mukame, S.; Smilansky, U.; Sobel, M. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24709 (HMI—373, pp 18) **Multiple Coulomb excitation of very heavy systems within the classical S-matrix theory.** Froebrich, P.; Kaufmann, P. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24710 (HMI—373, pp 19) **Partial coherence in heavy-ion reactions.** Hartmann, K.H.; Duennweber, W.; Frahn, W.E. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24711 (HMI—373, pp 20) **Folding methods in heavy-ion physics.** Krappe, H.J. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24712 (HMI—373, pp 24) **Determination of potentials from the scattering function.** Lipperheide, R.; Fiedeldey, H. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24713 (HMI—373, pp 24) **Spin-orbit potentials from reaction calculations of spin-flip.** Lipperheide, R.; Liu, Q.K.K. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24714 (HMI—373, pp 57) **Monte-Carlo-simulation of particle decay following binary nuclear reactions.** Rauch, W.; Homeyer, H. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

24715 **(KFK—3402) Calculating matrix elements of slater determinant wave functions in the cluster model. Pt. 2.** Beck, R.; Dickmann, F. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Angewandte Kernphysik 2). Sep 1982. 54p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750304.

A method for projecting angular momentum in two-cluster systems with intrinsic orbital angular momentum is presented. The method is an analytical one making use of Racah algebra and exploiting tensor properties of two-cluster shell model wave functions. As an application, reduced matrix elements of spin-isospin independent scalar operators and of the electric charge multipole operator are calculated in the case where one of the clusters in the two-cluster wave function may carry an intrinsic orbital angular momentum.

6540 Radiation And Shielding Physics

REFER ALSO TO CITATION(S) 24738

24716 **(ANL/NESC—754) DEMONR; unbiased Monte Carlo slab shield code.** Courtney, J.C. (Louisiana State Univ., Baton Rouge (USA). Nuclear Science Center). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048754.

Only one shield may be used in each problem. The shield material may be a single element or a homogeneous mixture of elements with a single effective atomic weight. Only elastic scattering and neutron capture processes are allowed. The source is a point located on one face of the slab.

DEMONR treats the behavior of neutrons in a slab shield. It is frequently used as a teaching tool.IBM360/65; FORTRAN IV; HASP 3.1; A card reader, tape drives, line printer, and 60K of memory are required.

24717 **(ANL/NESC—756) TIMEX; 1-dimensional time-dependent multigroups discrete ordinates.** Hill, T.R.; Reed, W.H. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048756.

Variable dimensioning is used so that any combination of problem parameters leading to a container array less than MAXCOR can be accommodated. In addition, the CDC version permits the use of extended core storage less than MAXECS. Reference report, LA-6201-MS.

TIMEX solves the time-dependent, one-dimensional multigroup transport equation with delayed neutrons in plane, cylindrical, spherical, and two-angle plane geometries. Both regular and adjoint, inhomogeneous and homogeneous problems subject to vacuum, reflective, periodic, white, albedo or inhomogeneous boundary flux conditions are solved. General anisotropic scattering is allowed and anisotropic inhomogeneous sources are permitted.IBM360,370;CDC7600; FORTRAN IV; OS/360,370 (IBM360,370), SCOPE 2.1.3 (CDC7600); Use of a container array of 50,000 requires 500K bytes of IBM storage for execution. Five interface units may be required (use is optional), 2 system input/output units and 5 output units are required for the IBM version. Use of a container array of 16,000 and 16,000 words of ECS requires 164K total words of CDC storage for execution. Two system input/output units and 11 additional input/output files are defined in the CDC version.

24718 (ANL/NESC—758) COREL;RASE4;DAMG2; ion implantation deposition. Brice, D.K. (Sandia National Labs., Albuquerque, NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048758.

COREL calculates the final average projected range, standard deviation in projected range, standard deviation in locations transverse to projected range, and average range along path for energetic atomic projectiles incident on amorphous targets or crystalline targets oriented such that the projectiles are not incident along low index crystallographic axes or planes. RASE4 calculates the instantaneous average projected range, standard deviation in projected range, standard deviation in locations transverse to projected range, and average range along path for energetic atomic projectiles incident on amorphous targets or crystalline targets oriented such that the projectiles are not incident along low index crystallographic axes or planes. RASE4 also calculates the instantaneous rate at which the projectile is depositing energy into atomic processes (damage) and into electronic processes (electronic excitation), the average range of target atom recoils projected onto the direction of motion of the projectiles, and the standard deviation in the recoil projected range. DAMG2 calculates the distribution in depth of the energy deposited into atomic processes (damage), electronic processes (electronic excitation), or other energy-dependent quality produced by energetic atomic projectiles incident on amorphous targets or crystalline targets oriented such that the projectiles are not incident along low index crystallographic axes or planes.CDC6600,7600; FORTRAN IV.

24719 (ANL/NESC—823R) SPAR1; shielding with analytic ray-tracing. Wallace, O.J. (SEE CODE- 0806000 Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048823.

No more than 20 energy levels, 20 slab and 20 curved shield laminas, and one detector point can be considered in one case. Up to 250 cases can be grouped in one run. Reference reports, WAPD-TM-1196 and WAPD-TM-1197.

SPAR1 calculates exact gamma-ray fluxes from uniform sources with the shapes of slabs, disks, lines, cylinders, truncated cones, toroids, and spheres. Gamma-ray dose rates and energy absorption rates can also be obtained by including in the program input data gamma-ray buildup factors expressed in Taylor Exponential Coefficient form. Furthermore, SPAR1 will calculate fast-neutron dose rates and thermal-neutron fluxes in those cases where the use of neutron-removal cross sections is valid. In general, all three-dimensional sources having curved surfaces (cylinders, spheres, and toroids) may have both curved and slab shields intervening between the source and the detector point. Slab shields are allowed in all cases. Both slab and curved shields are assumed to be laminar. Source self-attenuation is always included in flux calculations, and multiple energy levels may be considered. Both interior and exterior detector points are allowed for cylindrical, slab, and spherical sources, and line sources may be tilted with respect to their slab shields. The detector point associated with a cylindrical volume source may be arbitrarily located, and a finite cylindrical shield may be considered. A cylindrical surface source is also available.CDC6600,7600; FORTRAN IV; SCOPE 3.1 (CDC6600); 50K central memory and one system disk (CDC6600).

24720 (ANL/NESC—984) PELSHIE2; point kernel integration shielding. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Thompson, J.I. (Atomic Energy Board, Pelindaba, Pretoria (South Africa)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048984.

Maxima of - 225 subregions per source 80 different photon energies per source 18 energy groups 10 different shielding regions Only photons with an energy greater than 100 keV can be handled by the program. Build-up below 250 keV is ignored.

PELSHIE2 calculates dose rates from gamma-emitting sources with different source geometries and shielding configurations. Eight source geometries are provided and are called by means of geometry index numbers. Gamma-emmission characteristics of 133 isotopes, attenuation coefficients for 57 elements and other shielding materials, and Berger build-up parameters for 17 shielding materials can be obtained from two associated direct-access libraries. For extended sources, constant source strengths, as well as exponential and cosine or Bessel functions source strength distributions, are allowed in most cases.IBM360,303x; FORTRAN IV (99%) and BAL (1%); OS/MVT, OS/MVS; 140K and 60K bytes of memory are required by PELSHIE2 and the auxiliary program, respectively. Two direct-access devices (units 2 and 3) are used by both programs..

24721 (CONF-820274—3) Positron-annihilation characteristics in real solids including many-body enhancement effects. Chakraborty, B. (Argonne National Lab., IL (USA)). Jun 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007627.

From 2. national symposium on positron annihilation; Madras, India (8 Feb 1982).

Portions are illegible in microfiche products.

A density functional scheme has been developed for incorporating electron-positron correlation effects into band-structure calculations of positron-annihilation characteristics. The electron and positron densities are determined from a self-consistent set of equations based on a generalized Kohn-Sham scheme. Application of this formalism to defect-free aluminum is described. The results for a two-dimensional angular-correlation spectrum and the positron lifetime show very good agreement with experiment. The method is of general applicability and can be used with any existing self-consistent band-structure scheme.

24722 (CONF-820397—2) Linear transport theory and an indefinite Sturm-Liouville problem. Kaper, H.G.; Lekkerkerker, C.G.; Zettl, A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 45p. NTIS, PC A03/MF A01. Order Number DE83008552.

From Conference on differential equations - lecture notes in mathematics; Dundee, UK (29 Mar 1982).

Linear-transport processes occur whenever particles move in a host medium, carrying mass, momentum, and energy from one point of the medium to another. Mathematical models of such transport processes involve two operators, one accounting for free streaming of the particles, the other for interactions between the particles and the atoms or molecules of the surrounding host medium. We investigate a time-independent electron-transport problem, where the free-streaming operator is the multiplicative coordinate operator in $L^2(-1,1)$ and the interaction operator is the Legendre differential operator.

24723 (DOE/ER/70064—T1) Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981. Pantell, R.H. (Stanford Univ., CA (USA). School of Engineering). 16 Mar 1982. Contract AT03-76ER70064. 22p. NTIS, PC A02/MF A01. Order Number DE82020511.

Portions are illegible in microfiche products.

Theoretical and experimental studies have been performed on the radiation emitted by electrons and positrons channeled by planes and axes in crystals. The theoretical work consisted primarily of the determination of the properties of the radiation (photon energy, linewidth, direction, polarization and intensity) using appropriate crystal potential functions in the relativistic wave equation. Excellent agreement between theory and experiment was achieved using a many-beam analysis based upon theHartree-Fock model of the atom. Experimental work was done with the linear accelerator at the Lawrence Livermore National Laboratory. Electrons and positrons were channeled in both silicon, germanium, and diamond crystals (most of the effort was with Si) at energies of 28 and 54 to 56 MeV. The crystal was mounted on a three-axis gomiometer with 60 μrad resolution. With the particle beam deflected by a dump magnet, forward directed x-ray radiation was observed with a Ge:Li detector. This research has demonstrated that it is possible to study both crystal properties and the channeling phenomenon by

means of channeling radiation. In addition, an interestig new source of hard x-rays has been produced that is well collimated, linearly polarized, of picosecond duration, relatively narrow bandwidth, and tuneable.

24724 **(IKE—6-138) Re-evaluation of the neutron scattering dynamics in heavy water, generation of multigroup cross sections for THERM-126.** Keinert, J. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Jun 1982. 33p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750127.

In providing THERM-126 with cross section matrices for deuterium bound in heavy water the IKE phonon spectrum was reevaluated. The changes are modifications in the acoustic part and in the frequency of the second oscillator. Contrary to the phonon spectrum model for D in D_2O in ENDF/B-IV the broad band of hindered rotations is assumed to be temperature dependent taking into account the diffusive motion of the molecule. With the new model scattering law data S (α, β) are generated in the temperature range 293.6 K-673.6 K. The THERM-126 scattering cross section matrices are calculated up to P_3. As a validity check a lot of differential and integral cross sections are compared to experiments and benchmarks are recalculated.

24725 **(Juel—1774) Installation of a positron annihilation apparatus for the investigation of Fermi surfaces.** Fischer, H.P. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung). Mar 1982. 104p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750142.

Dissertation submitted to Goettingen Univ., Germany, F.R.

An experimental apparatus to investigate the Fermi surfaces of binary alloys with positron annihilation is described. The principle of rotating specimen with the angular correlation at constant deviation angle is applied combined with a new crossed slit geometry using collimators which are grooves engraved in steel plates. The resolution is vertical 0.88 mrad and horizontal 1.6 mrad. The apparatus is fourfold to measure simultaneously four crystal directions at 5° difference (multi-collimator geometry). In a given crystal plane the range of crystal directions covers 100°. A range attenuation to measure the necks of the Fermi surface with greater accuracy is provided. The use of external Cu-64 positron sources allows investigations of all alloy systems. A test measurement on pure copper single crystals is reported and proves the performance of the apparatus.

24726 **(LA—9610-MS) Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants.** Zardecki, A.; Gerstl, S.A.W. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 75p. NTIS, PC A04/MF A01. Order Number DE83008274.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The general purpose, discrete-ordinates transport code TWOTRAN is applied to describe the propagation and multiple scattering of a laser beam in a nonhomogeneous aerosol medium. For the medium composed of smoke, haze, and a rain cloud, the problem of the target detectability in a realistic atmospheric scenario is addressed and solved. The signals reflected from the target vs the signals scattered from the smoke cloud are analyzed as a function of the smoke concentration. By calculating the average intensity and a correction factor in the x-y and r-z geometries, the consistency of the rectangular and cylindrical geometry models is assessed. Received power for a detector with a small field of view is computed on a sphere of 1-km radius around the laser source for the Air Force Geophysics Laboratory rural aerosol model with extinction coefficients of 4 km^{-1} and 10 km^{-1}. This computation allows us to study the received power as a function of the angle between the detector and source axes. The correction factor describing the multiple-scattering enhancement with respect to the simple Lambert-Beer law is introduced, and its calculation is employed to validate the use of the small-angle approximation for the transmissometer configuration. An outline of the theory for a finite field of view detector is followed by numerical results pertaining to the received power and intensity for various aerosol models. Recommendations regarding future work are also formulated.

24727 **(LA-UR—82-3299) Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks.** Brenner, D.J.; Zaider, M. (Los Alamos National Lab., NM (USA); Columbia Univ., New York (USA). Radiological Research Lab.). 1982. Contract W-7405-ENG-36. 9p. (CONF-820998—3). NTIS, PC A02/MF A01. Order Number DE83003571.

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

In response to the need for detailed data on energy deposition in micron and sub-micron sites, the code PROTON has been developed to transport protons and electrons on an event-by-event basis in water vapor. The electrons are currently transported down to sub-electron-volt energies, making the results a suitable starting point for radiation chemistry studies. This report describes the details of some techniques we use to analyze the large amount of data produced by the code. In particular, we shall be concerned here with lineal energy distributions (lineal energy, y, is the energy deposited in a specified volume by a passing particle and its secondaries, divided by the mean path length through that volume). The fact that lineal energy spectra can be measured using microdosimetric techniques offers a useful opportunity for comparing Monte-Carlo-based predictions with experimental data.

24728 **(PB—83-143818) Measurements of inelastic scattering of eV neutrons. Final report.** Bowman, C.D.; Johnson, R.G. (National Bureau of Standards, Washington, DC (USA)). 1982. 3p. National Bureau of Standards, Washington, DC.

From Proceedings IPNS symposium on nuetron scattering; Argonne, IL (August 12-14, 1981).

A technique has been demonstrated for studying the inelastic scattering of eV neutrons using a pulsed white source. Measurements have been completed on benzene for incident energies in the range 1.5 to 15 eV and for q values from 13 to 120/A. Details of the method and possibilities for improvement and extension are presented.

24729 **(SAND—82-1821) Electron-channeling radiation: x-ray source feasibility study.** Sanford, T.W.L.; Beezhold, W.; Lee, J.R. (Sandia National Labs., Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. 47p. NTIS, PC A03/MF A01. Order Number DE83009179.

Properties of recently observed channeling radiation generated by electrons incident on crystalline axes, and in this case, electrons from a hypothetical 15-40-MeV high-current electron accelerator, are investigated in order to explore the feasibility of using channeling radiation as an intense 10- to 100-keV x-ray source for laboratory weapons effects studies. Under the assumption that the crystal remains intact long enough for the radiation to form and under the conditions of small beams divergence, high-energy electrons indeed generate channeling radiation in the above energy range. Because the low-energy channeling radiation is forward directed with a half angle inversely proportional to the electron energy, channeling radiation generated by focusing curved crystals could have application for those situations in which very high doses ($>$ 10 cal/gm(Au)) are desired over very small areas ($<$ .1 cm^2). However, because of very-low channeling lengths, calculations indicate that the dose-area product produced by an optimized-channeling radiation source is typically two orders-of-magnitude lower than that obtainable from a 1 MeV simulator like SPEED for equivalent total e-beam energy. Therefore, we conclude that unless channeling lengths can be increased and injection efficiency improved, an electron-channeling radiation source does not, for most laboratory nuclear-weapon-effects x-ray testing needs, offer cost-effective competition as compared to 1-2-MV bremsstrahlung sources.

24730 **Incoherent quasielastic neutron scattering from water in supercooled regime.** Chen, S.; Teixeira, J.; Nicklow, R. (Nuclear Engineering Department, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139). *Physical Review [Section] A: General Physics;* **26**: No. 6, 3477-3482(Dec 1982). Contract W-7405-ENG-26.

Measurements of the quasielastic spectra have been made with a three-axis neutron spectrometer at constant-Q mode in a temperature range from 38°C down to -20 °C. Two energy resolutions both high ($\Delta E = 100\ \mu$ eV) and low ($\Delta E = 800\ \mu$ eV) were used to identify and separate a sharp component from a broad one. As temperature is decreased below zero the spectrum shows an increasing sharp component standing out on top of the broad one. The broad component is attributed to rotational motions of water molecules. A preliminary analysis of the linewidths gives a Q-independent relaxation time which has the same magnitude as the rotational relaxation time measured by nuclear magnetic resonance. The Q dependence of the sharp line is analyzed by a Q-dependent diffusion coefficient. A temperature-independent characteristic length $l_0 = 0.5$ A is obtained. We then attempt to relate this length to local geometry of protons associated with hydrogen bonding.

24731 **Coherent absorption and emission processes of energetic particles penetrating crystals.** Datz, S. (Oak Ridge National Lab., TN). pp 179-188 of Inner-shell and x-ray physics of atoms and solids. Fabian, D.J.; Kleinpoppen, H. (eds.). New York, NY; Plenum Publishing Corporation (1981). Contract W-7405-ENG-26.

Channeled, highly stripped ions of sufficiently high atomic number $Z_1 \geqq 5$ can exist in a crystal in well defined quantum states and transitions between quantum states can be affected when resonant frequencies, dependent on crystal direction and velocity, are achieved. Studies of resonant coherent excitation of channeled ions constitute a form of absorption spectroscopy which yields information on the ionic states and the crystalline millieu. Experimental observation of both the absorption and emission phenomena in channeling has occurred only in the past two years and a brief review and collation of the various effects observed will be presented in this paper.

24732 **National Center for Small-Angle Scattering Research.** Koehler, W.C.; Hendricks, R.W.; Child, H.R.; King, S.P.; Lin, J.S.; Wignall, G.D. (Oak Ridge National Lab., TN). pp 75-85 of Scattering techniques applied to supramolecular and nonequilibrium systems. Chen, S.H.; Chu, B.; Nossal, R. (eds.). New York, NY; Plenum Publishing Corporation (1981). Contract W-7405-ENG-26.

The National Center for Small-Angle Scattering Research (NCSASR) is a national user-oriented facility dedicated to studying the structure of matter on the scale of tens to hundreds of angstrome (10^{-8} cm). The center, sponsored by the National Science Foundation (NSF) through an interagency agreement with the Department of Energy (DOE), was established at the Oak Ridge National Laboratory (ORNL) in 1978. It makes state-of-the-art equipment for neutron and x-ray small-angle scattering experiments available to qualified investigators from university, industrial, and other government laboratories. A description of the available instruments is given.

6550 Medical Physics

REFER ALSO TO CITATION(S) 24197, 24367, 24368, 24727

24733 (DOE/EV/04326—4, pp 1-13) **Calibration of phoswich detectors for the in vivo measurement of americium, plutonium and uranium: interlaboratory comparison using the Lawrence Livermore calibration.** 1982. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

In In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.

The accurate calibration of dual energy NaI-CsI (Tl) detectors for the in vivo measurement of uranium and transuranic nuclides deposited in the lungs and liver has been aided by the recent development of an accurate phantom by the Lawrence Livermore National Laboratory (LLNL). The thorax phantom is the most realistic human analog produced to date and provides for calibration of these nuclides over the normal range of chest wall thicknesses (CWT) and tissue composition. This paper presents an interlaboratory calibration study using this structure, and calibration curves as a function of CWT. (KRM)

24734 (DOE/EV/04326—4, pp 29-37) **Design and construction of a knee phantom for the calibration of Am-241 in bone.** 1982. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

In In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.

This paper examines the use of the patella region as an alternative or complementary measurement site for use in estimation of the total Am-241 skeletal content. As a first step, an Am-241 knee phantom was designed and constructed for calibration of this measurement geometry. (KRM)

24735 (DOE/EV/04326—4, pp 51-60) **Assessment of surrogate structures for whole body counting.** 1982. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

In In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.

Evaluation of internally-deposited, photon-emitting radionuclides by external in vivo scintillation measurements requires a method to calibrate the radiation detectors in order to convert counts measured by the detection system into an amount of activity deposited in the organ or tissue of interest. The most practical calibration techniques for in vivo measurement procedures involve construction and measurement of human surrogate structures in which known amounts of activity are inserted in artificial tissues and/or organs to simulate the expected distribution. In this paper, in vivo measurements with the NYU Am-241 skull phantoms and the skull from a skeleton with an incorporated Am-241 burden, derived from accidental inhalation exposure, demonstrates the validity of well-designed surrogate structures as a primary calibration mechanism. (KRM)

24736 (DOE/EV/04326—4, pp 61-76) **Estimation of the cumulative exposure to uranium mine atmospheres by in vivo measurements of lead-210 in the skull.** 1982. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

In In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.

The methodology for measuring Pb-210 in vivo by whole-body counting techniques using low background, NaI-CsI(T1) detectors is discussed with the expectation that as more individuals are measured with increasing accuracy, a relationship will emerge which will prove useful and possibly more accurate for predicting past exposures than the methods relied upon in the past. (KRM)

24737 (DOE/EV/04326—4, pp 77-108) **Low-energy, photon-emitting nuclides: reference spectra library.** 1982. NTIS, PC A06/MF A01. Order Number DE83006975.

Portions are illegible in microfiche products.

In In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982.

A reference library consisting of the measured spectral response of the NaI-CsI(T1) detector to point source spectra for 20 low-energy emitting nuclides has been established and its use is the topic of the appendix to this progress report. In addition to the point source geometry, spectra which are representative of in vivo thoracic measurements have been added. (KRM)

24738 **(GSF-S—859) Secondary electron spectra in the trace of fast ions travelling through water vapor.** Kollerbaur, J. (Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.). Inst. fuer Strahlenschutz). Feb 1982. 66p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750307.

Results are presented giving insight in the radial electron- and energy transport mechanisms (LET) in the trace of fast ions (1 MeV protons). With increasing radius the electron energy distribution is shifted to higher-energies. In the most important energy region the results are in agreement with Monte-Carlo-calculations, thus such calculations are of great importance for a complete analysis of the trace structure.

6560 Solid State Physics

REFER ALSO TO CITATION(S) 23934, 23946, 24024, 24031, 24037, 24056

24739 **(CONF-8206162—1) Initiation and development of deformation heterogeneities in superplastic materials.** Kocks, U.F. (Argonne National Lab., IL (USA)). Feb 1982. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83007676.

From AIME symposium on superplastic forming of structural alloys; San Diego, CA, USA (20 Jun 1982).

Portions are illegible in microfiche products.

Deviations from steady-state deformation are important in a consideration of superplasticity, for two reasons. First, true steady state is not actually attained in most cases, especially in tension. Second, since steady state is generally caused by a statistical, dynamic balance between hardening and softening processes, local chance deviations should be expected, for example in the strain rate. An important material property is the degree of stability of the steady state, i.e., the rapidity with which fluctuations decay. Any temporary local deviation in strain rate produces integrated differences in strain; this process is identified as the initiation of the deformation heterogeneities, whose further development has been described before. There are two material parameters that influence the localization behavior: one is related to (though not always equal to) the rate sensitivity of steady state, the other to the rate sensitivity of primary-creep decay or of work hardening. A quantitative description of the phenomenology is given, as well as prescriptions for the experimental measurement, and possibly the control, of these material parameters.

24740 (HMI—373, pp 137) **Local 4f moment studies by TDPAD.** Barth, H.J.; Luszik-Bhadra, M.; Netz, G.; Riegel, D. 1982. (In German, English). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.

In Scientific progress report 1981.

24741 **(LBL—13220) Spin waves at surfaces and steps in ferromagnets and antiferromagnets.** Falicov, L.M. (Lawrence Berkeley Lab., CA (USA)). Aug 1981. Contract W-7405-ENG-48. 13p. (CONF-810866—2). NTIS, PC A02/MF A01. Order Number DE82000277.

From NATO advanced study institute on excitations in disordered systems; E Lansing, MI, USA (23 Aug 1981).

The study of the properties of elementary magnetic excitations - spin waves or magnons - in the neighborhood of surfaces, discontinuities, defects, and impurities is an active field of solid-state magnetism. These modes are of interest for understanding relaxation phenomena as well as chemical reactions catalyzed by magnetic substrates. In this contribution we would like to report two different results: (1) some spectra of the spin-wave modes associated with clean and stepped surfaces of a ferromagnet - the clean and a stepped (001) surface of a face-centered-cubic solid; and (2) the unusual and yet unresolved difficulties encountered when similar procedures are attempted on antiferromagnetic surfaces and steps.

24742 **Monte Carlo simulation of diffusion of gases in a porous solid: Calculations for a new class of solids.** Nakano, Y.; Evans, J.W. (Department of Materials Science and Mineral Engineering, University of California, Berkeley, California 94720). *Journal of Chemical Physics;* **78**: No. 5, 2568-2572(1 Mar 1983).

In a previous paper, a Monte Carlo simulation of the Knudsen diffusion of a gas in a porous solid was carried out. The simulated porous solid had pore walls that were convex. In the present paper, the simulation is repeated using simulated solids whose pore walls are concave. It was found that the results of both studies could be correlated by a single equation. This equation enables the prediction of the Knudsen diffusiveness from the porosity and mean pore size without resort to a tortuosity factor.

24743 **Charge transfer and the effective Coulomb interaction at metal surfaces.** Watson, R.E.; Davenport, J.W.; Perlman, M.L. (Departments of Physics and Chemistry, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review [Section] B: Condensed Matter;* **26**: No. 12, 6476-6479(15 Dec 1982).

The change in electrostatic potential due to charge transfer on or off a crystal surface is estimated for a number of fcc, bcc, and hcp surfaces and the results are compared with the observed surface-to-bulk core-photoelectron binding-energy shifts. The effective Coulomb interaction associated with such charge transfer can be larger than the intra-atomic interaction term alone and hence larger than the bandwidth for typical transition metals. Some implications for chemisorption and layered structures are noted.

24744 **Chemisorption of oxygen on Cu(110) studied by eels and leed.** Wendelken, J.F. (Oak Ridge National Lab., TN). *Surface Science;* **108**: 605-616(1981). Contract W-7405-ENG-26.

The chemisorption of oxygen on Cu(110) has been studied with electron energy loss vibrational spectroscopy and low energy electron diffraction. Depending on crystal temperatures during oxygen exposure and subsequent heat treatments, (1 x 1), c(6 x 2), and (2 x 1) LEED patterns are obtained. However, in all cases and independent of exposure, a single vibrational energy was observed at 49 meV for ^{16}O and at 46 meV for ^{18}O. This invariance of energy suggests a shielded site location in or beneath the surface in support of the result of a recent ion scattering study. The (2 x 1) structure is shown to form in islands at less than saturation coverage on the basis of observed vibrational intensities.

6561 Superconductivity

REFER ALSO TO CITATION(S) 23944, 23945, 23973, 23974, 24027, 24028, 24041

24745 **(DOE/ER/10959—2) Magnetic impurities in superconductors. Progress report, August 1, 1982-June 30, 1983.** Ruvalds, J. (Virginia Univ., Charlottesville (USA). Dept. of Physics). 1983. Contract AS05-81ER10959. 30p. NTIS, PC A03/MF A01. Order Number DE83008712.

Research progress is reported on enhanced and re-entrant superconductivity studies, spin susceptibility and RKKY coupling in superconductors, and resistance minimum induced by magnetic impurity pairs. (WHK)

24746 **Kapitza thermal boundary resistance between two solids.** Anderson, A.C. (Univ. of Illinois, Urbana). pp 1-30 of Nonequilibrium superconductivity, phonons, and Kapitza boundaries. Gray, K.E. (ed.). New York, NY; Plenum Publishing Corporation (1981). Contract AC02-76ER01198.

While investigating the transport of heat in superfluid ^4He, Kapitza (1941) observed a large temperature difference ΔT between his copper heater and the liquid helium. He deduced that the entire Δ occurred very close to the copper-helium interface. It is permissible therefore to define a thermal boundary resistance R/sub K identical with $\Delta T/Q$, where Q is the heat flux per unit area of interface. R/sub K/, now called the Kapitza resistance, has been shown to have a temperature dependence of $\approx T^{-3}$. Initially it was suggested that R/sub K/ was related to the superfluid character of liquid ^4He at temperatures below 2°K. However, by 1960 it was apparent that a Kapitza resistance also occurs between two solid materials, and that this phenomenon should be related to the reflection and refraction of thermal phonons at the interface. A theory based on the scattering of phonons at the interface has become known as the acoustic-mismatch model (Little, 1959). This theory successfully accounts for R/sub K/ between most solids, but explains only a few of the details in the Kapitza resistance to liquid helium. The present paper discusses the solid-solid boundary resistance.

6570 Theoretical Physics

REFER ALSO TO CITATION(S) 24158, 24726, 25244

24747 (ANL/NESC—987) L2RMAT; coupled channel inelastic scattering. Walker, R.B.; Schneider, B.I. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048987.

The S-matrix analysis assumes there are no coulomb interactions.

L2RMAT solves the coupled, second-order differential equations of quantum inelastic scattering theory. The physical problem is defined by user-supplied subroutines, POT and LIST.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.4 (CDC CYBER175); 166,000 (octal) words of memory are required to execute the sample problem..

24748 (BONN-HE—82-14) Particle-two particle interaction in configuration space. Kuzmichev, V.E. (Bonn Univ. (Germany, F.R.). Physikalisches Inst.). Jul 1982. 17p. NTIS (US Sales Only), PC A02 MF/A01. Order Number DE83750136.

The problem if three indentical particles with zero-range two-particle interaction is considered. An explicit expression for the effective potential between one particle and the remaining two-particle system is obtained in the coordinate representation. It is shown that for arbitrary energies, at small and, for zero energy, at large distances rho between the one particle and centre of mass of the other two particles the diagonal matrix element of the effective potential is attractive and proportional to $1/rho^2$. This property of the effective potenial explains both the Thomas singularity and the Efimov effect. In the case of zero total energy of the system the general form of the solution of the three-particle integral equation is found in configuration space.

24749 (BONN-HE—82-15) Test of three-body separable pole expansions at negative and positive energies. Cravo, E.; Fonseca, A.C.; Haberzettl, H. (Bonn Univ. (Germany, F.R.). Physikalisches Inst.). Jul 1982. 30p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750140.

We compare the performance of separable pole expansions for the three-body amplitude in reproducing three-body data at both negative and positive energies. In addition to the Generalized Unitary Pole Expansion and the Energy Dependent Pole Expansion, we present results for two new expansions. As benchmarks for our calculations, we use the three-boson results of Aaron, Amado, and Yam. At positive energies, we calculate phase shifts and inelasticities. At negative energies, we give off-shell scattering amplitudes and investigate how well the expansions are capable of generating the second bound state of the three-boson problem, if the first is put explicitly into the expansions. In general, we find that the results get better the more energy dependence is explicitly contained in the expansion functions. The relevance of these findings for four-body calculations, which employ separable three-body input, is discussed briefly.

24750 (NP—2903373) Electron flow generation of energy in a field of two transverse electromagnetic type waves. Preprint 218. Zhurakhovskii, V.A.; Kulish, V.V.; Chemeris, V.T. (AN Ukrainskoj SSR, Kiev. Inst. Ehlektrodinamiki). 1980. 43p. Inst. of Electrodynamics, Kiev, USSR. Order Number DE82903373.

A formulation is made of a working algorithm for the use of a second approximation by the averaging method in solving differential equations for slowly changing variables at purely periodic right-hand sectors within the limits of an extended time interval and length. This algorithm is used to construct a system of smoothed out equations for electron efficiency and the electromechanical phase. Conditions for intensive energy exchange are identified. The electron efficiency at a single-section interaction was shown not to exceed 10% because of particle resonance and wave disruption during electron inhibition. That efficiency was shown to increase up to 30% at a two-sectional interaction during which a preliminary grouping of the flow takes place, and an electrostatic field occurs in the selection zone to compensate for the electron energy loss. 18 references, 4 figures.

24751 Enskog theory for multicomponent mixtures. I. Linear transport theory. Lopez de Haro, M.; Cohen, E.G.D.; Kincaid, J.M. (The Rockefeller University, New York, New York 10021). *Journal of Chemical Physics;* **78**: No. 5, 2746-2759(1 Mar 1983).

The Enskog theory for dense multicomponent fluid mixtures is developed. Two versions are considered: the standard theory and the revised theory. Explicit expressions for all the transport coefficients (shear and bulk viscosity, thermal conductivity, mutual and thermal diffusion coefficients) in terms of the sizes, masses, and concentrations of the constituents of the mixture are given in the third Enskog approximation. Applications will be discussed in subsequent papers.

24752 Comment on: On the Chapman—Enskog solution method for mixtures [B. C. Eu, J. Chem. Phys. 74, 6373 (1981)]. Karkheck, J.; Kincaid, J.M.; Stell, G. (Department of Science and Mathematics, GMI Engineering and Management Institute, Flint, Michigan 48502). *Journal of Chemical Physics;* **78**: No. 5, 2807-2809(1 Mar 1983).

A recent criticism by Eu of the Chapman—Enskog method of solution for the mixture set of Boltzmann equations is reexamined. His proposed alternative is shown to be based upon a set of linear equations that in general has no solution. The new approach proposed by Eu is appropriately corrected and shown to be less general than the Chapman—Enskog method and contained within the latter as a special case.

24753 Acoustic scattering by elastic solid cylinders and spheres in viscous fluids. Lin, W.H.; Raptis, A.C. (Components Technology Division, Argonne National Laboratory, Argonne, Illinois 60439). *Journal of the Acoustical Society of America;* **73**: No. 3, 736-748(Mar 1983).

This paper deals with analytic studies and numerical results of the scattering of plane sound waves from an elastic circular cylinder and from an elastic sphere in a viscous fluid. The elastic properties of the cylinder and the sphere and the viscosity of the surrounding fluid are taken into account in the solution of the acoustic-scattering problems. The associated acoustic quantities, such as the acoustic-scattering patterns, the acoustic-radiation forces, and the acoustic attenuation, are first derived in closed forms and then evaluated numerically for a given set of material properties. Numerical results show that increasing fluid viscosity tends to increase the directionality of the angular distribution of the scattering patterns, especially in the forward direction. The acoustic-radiation force on the cylinder or on the sphere is in the direction of the incident wave and increases as the viscosity of the fluid increases. The plots of the acoustic-attenuation coefficients versus the dimensionless wavenumber of the incident sound wave reveal oscillatory phenomena, which are caused by the resonant vibrations of the cylinder or the sphere.

24754 Predissociation in an intense electromagnetic field. Lami, A.; Rahman, N.K. (Istituto di Chimica Quantistica ed Energetica Molecolare, Via Risorgimento, 35-56100 Pisa, Italy). *Physical Review [Section] A: General Physics;* **26**: No. 6, 3360-3368(Dec 1982).

The problem of predissociation in a strong electromagnetic field is investigated in the context of a double-resonance scenario. A nonperturbative approach is followed. Numerical examples are given to show how the line shape is modified. The results are also discussed in connection with the possibility of a photocatalytic effect.

24755 Breather annihilation by simple dissipation. McLaughlin, D.W.; Overman, E.A. II. (Department of Math and Progress in Applied Mathematics, University of Arizona, Tucson, Arizona 85704). *Physical Review [Section] A: General Physics;* **26**: No. 6, 3497-3507(Dec 1982).

A numerical experiment is conducted on the decay of a sine-Gordon breather under simple dissipation. Both the spatial configuration and the (nonlinear) spectral configurations are measured nu-

merically. The spectral configuration establishes that the breather is annihilated in finite time and that the annihilation process is accomplished by the generation of a long-wavelength packet of dispersive radiation. The nonlinear radiation density, which is measured numerically, is seen to be order 1 and is extremely well approximated by a sech profile in k space. Finally, a representation of the spectral configuration by "resonance" states is investigated.

24758 **Hard-core square-well fermions.** Baker, G.A. Jr.; Benofy, L.P.; Fortes, M.; de Llano, M.; Peltier, S.M.; Plastino, A. (Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] A: General Physics;* 26: No. 6, 3575-3588(Dec 1982).

Based on the well-known low-density expansion for the ground-state energy per particle of a many-fermion system interacting pairwise via a central potential we develop a perturbation scheme in which the zero-order state is that of the purely-repulsive-spheres fluid. For the hard-core plus square-well pair-interaction case we have deduced, for two-species fermion matter, perturbation formulas up to sixth order in the attractive coupling parameter. We explicitly report results up to fourth order here. Pade-approximant analyses in the density are carried out in each order with the intent of providing the basis necessary for extensive equation-of-state calculations of various many-fermion systems. In particular, for zero order (the fermion hard-sphere fluid) we predict an uncertainty-principle divergence in the energy, and hence pressure, corresponding to the random close packing of spheres, at a density of about 0.5 times the recently obtained value for boson hard spheres and about 0.2 times the well-known empirical value for classical hard spheres.

6580 Mathematical Physics

24757 **Focus waves modes in homogeneous Maxwell's equations: Transverse electric mode.** Brittingham, J.N. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Journal of Applied Physics;* 54: No. 3, 1179-1189(Mar 1983).

This paper presents mathematical formulations for new, three-dimensional, packet-like solutions to the free-space homogeneous Maxwell's equations. These solutions are real, nonsingular, continuous functions which propagate in a straight line at light velocity. They remain focused for all time. The asymptotic behavior of the fields away from the moving pulse center has a magnitude which decreases as the inverse of the distance from the pulse centers.

70 FUSION ENERGY

7001 Plasma Research

REFER ALSO TO CITATION(S) 24843, 24852, 24854, 24876, 24994, 25041, 25165, 25166, 25167, 25170, 25171

24758 **(ANL/NESC—749) STEEP4; thermonuclear reaction rates.** Harris, D.R.; Hale, G.M. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048749.

The form of the slowing-down distribution neglects absorption and leakage of plasma particles during the slowing-down process and is based on the assumption that the slowing-down ion is faster than the background ions but slower than the plasma electrons. Reference report, LA-6344-MS.

STEEP4 calculates fusion reaction rates in terms of the specific reactivity (sigma-v) which is the product of cross section and relative velocity averaged over the actual ion distributions of the interacting particles in the plasma. Maxwellian ion distributions are modified to include slowing-down contributions which are characterized in terms of plasma parameters. Rapid and accurate algorithms are used for integrating the specific reactivity from spectra and input cross sections. Options are also provided for rapid calculation of screening effects on specific reaction rates.CDC6600,7600; FORTRAN IV; SCOPE 2.1.3; A SC4020 Film Unit is used to provide film plotting capability.

24759 **(CONF-821045—3) Sputter-induced erosion of alkali metal surfaces - AES, XPS and SIMS studies.** Krauss, A.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83007720.

From Symposium on effective utilization of surface analysis techniques in plasma surface interactions; Sapporo, Japan (4 Oct 1982).

Portions are illegible in microfiche products.

This paper will discuss the manner in which the techniques of Auger-electron spectroscopy (AES), X-ray-photoelectron spectroscopy (XPS), secondary-ion mass spectroscopy (SIMS) and ion-scattering spectroscopy (ISS) may be used to study the use of high secondary-ion-yield surfaces as a means of reducing plasma-impurity influx in magnetic-confinement fusion devices.

24760 **(DOE/ER/10613—2) Superfast Z-pinch-produced plasmas.** Hsing, W.W. (Columbia Univ., New York (USA). Plasma Physics Lab.). 1983. Contract AC02-80ER10613. 117p. NTIS, PC A06/MF A01. Order Number DE83009278.

Thesis.

The superfast z-pinch has been investigated as a possible means of producing an ultra-high (~ 100 keV) temperature plasma. An ion Vlasov fluid electron code is shown to simulate the experimental behavior of a pinch. Dependence of the temperature on wall generated impurity, initial density profile, and generator parameters are indicated. Extrapolation of the code using state of the art pulse generators indicate feasibility of an ultra-high temperature plasma.

24761 **(DOE/ET/53051—49) Plasma potential in a magnetic mirror with electron-cyclotron-resonance heating.** Smith, P.K. (Wisconsin Univ., Madison (USA)). Jan 1983. Contract AC02-76ET53051. 167p. NTIS, PC A08/MF A01. Order Number DE83009355.

Portions are illegible in microfiche products. Original copy available until stock is exhausted; Thesis.

Experimental and theoretical studies of the ECRH plasma in the University of Wisconsin DE Machine magnetic mirror have been undertaken. Typical plasma parameters in these experiments were T/sub e/ - 10 to 30 eV, T/sub i/ - 4 eV, V/sub po/ (plasma potential at midplane) ~ 20 to 50 V, midplane plasma density n_0 - 10^{16} m^{-3}, B_0 (magnetic field strength on axis at midplane) - .005 to .01 T, mirror ratio R - 5 to 20. The principal experimental findings were the appearance of strong density peaks (~ 2 x background) and notable V/sub f/ dips (~ kT/sub e//e) in a narrow (~ 1 cm) region near the axial positions of cyclotron resonance. The properties of these dips do not change greatly over the range of operating parameters, but are narrower at higher pressures.

24762 **(DOE/ET/53088—84) Kinetic theory of Alfven waves.** Mahajan, S.M. (Texas Univ., Austin (USA)). Mar 1983. Contract FG05-80ET53088. 50p. (IFSR—84). NTIS, PC A03/MF A01. Order Number DE83009162.

The addition of electron parallel dynamics in the description of an inhomogeneous current carrying cylindrical plasma is shown to replace the magnetohydrodynamic continuum, associated with Alven waves, by a discrete spectrum. The spectrum of the resulting discrete modes is determined analytically and numerically.

24763 **(GA-A—16853) Laser-fluorescence measurements of hydrogen and metal densities in the Doublet III tokamak.** Muller, C.H. III; Eames, D.R.; Burrell, K.H. (GA Technologies, Inc., San Diego, CA (USA)). Jan 1983. Contract AT03-76ET51011. 23p. (CONF-821111—23). NTIS, PC A02/MF A01. Order Number DE83008499.

From 29. national symposium on American Vacuum Society; Baltimore, MD, USA (16 Nov 1982).

A general overview of the Doublet III laser-spectroscopy program is presented. This program includes tokamak diagnostic experiments and laboratory development work. Measurements of titanium and deuterium in Doublet III are presented along with recent laboratory results. Sputtering of the vacuum walls by ener-

getic charge-exchange neutrals from the plasma center appears to be responsible for the observed Ti impurities in Doublet III. Resonance-fluorescence scattering from deuterium atoms near the plasma center has been observed using a broadband dye laser and a narrow-band detector. The feasibility of determining ion temperatures using this technique is discussed. Using the measured deuterium densities we have calculated a local-electron particle-confinement time. Laboratory measurements of carbon and oxygen densities using two-photon laser excitation and of FeI speed distributions (temperatures) using a laser double-pulse excitation technique are shown to be applicable to the tokamak conditions of Doublet III.

24764 **(LA-UR—83-291) Some nonlinear estimates for lateral propagation of self-generated B fields.** Goldman, S.R. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 10p. (CONF-8209113—1). NTIS, PC A02/MF A01. Order Number DE83007576.

From CECAM workshop; Paris, France (13 Sep 1982).

We present nonlinear estimates which provide plausible guidelines and scalings for the lateral transport of magnetic fields due to laser-plasma interaction in both slab and cylindrical geometries. Limitations of the modelling are also indicated.

24765 **(PPPL—1772) Operating tokamaks with steady-state toroidal current.** Fisch, N.J. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Apr 1981. Contract AC02-76CH03073. 7p. NTIS, PC A02/MF A01. Order Number DE83009152.

Continuous operation of a tokamak requires, among other things, a means of continuously providing the toroidal current. Various methods have been proposed to provide this current including methods which utilize radio-frequency waves in any of several frequency regimes. Here we elaborate on the prospects of incorporating these current-drive techniques in tokamak reactors, concentrating on the theoretical minimization of the power requirements.

24766 **(PPPL—1977) Lower hybrid heating and current drive on PLT.** Stevens, J.E.; Bernabei, S.; Bitter, M. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Mar 1983. Contract AC02-76CH03073. 32p. (CONF-820345—17). NTIS, PC A03/MF A01. Order Number DE83008981.

From Symposium on heating in toroidal plasmas; Grenoble, France (22 Mar 1982).

800 MHz lower hybrid waves have been launched into PLT with a six waveguide coupler. Recent improvements have allowed powers up to 400 kW to be launched with good coupling (R ~ 10 to 25%). Experiments at low density (anti n/sub e/ < 7 x 10^{12} cm^{-3}, i.e., ω/ω/sub LH/ > 2) have demonstrated current drive and plasma heating. Experiments at higher densities have produced hot-ion tails, but so far have shown inefficient body heating. To date, only a limited parameters space has been investigated at high power.

24767 **(PPPL—1980) Ray-tracing study of electron-cyclotron heating in toroidal geometry.** Kritz, A.H.; Hsuan, H.; Goldfinger, R.C.; Batchelor, D.B. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Mar 1983. Contract AC02-76CH03073. 40p. NTIS, PC A03/MF A01. Order Number DE83008980.

TORAY, a ray-tracing code has been developed to study electron-cyclotron heating and current drive in toroidal geometry. Ray patterns are initiated similar to those of an actual antenna and a full graphics package has been developed for displaying the behavior of the rays. We study the interplay of the plasma and wave parameters in order to establish which parameters are most important in determining the energy deposition.

24768 **(PPPL—1982) Effects of toroidicity on resistive tearing modes.** Izzo, R.; Monticello, D.A.; Manickam, J.; Strauss, H.R.; Grimm, R.; McGuire, K. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Mar 1983. Contract AC02-76CH03073. 30p. NTIS, PC A03/MF A01. Order Number DE83008979.

A reduced set of resistive MHD equations is solved numerically in three dimensions to study the stability of tokamak plasmas. Toroidal effects are included self-consistently to leading and next order in inverse aspect ratio, ϵ. The equations satisfy an energy integral. In addition, the momentum equation yields the Grad-Shafranov equation correct to all orders in ϵ. Low beta plasma are studied using several different q-profiles. In all cases, the linear growth rates are reduced by finite toroidicity. Excellent agreement with resistive PEST is obtianed. In some cases, toroidal effects lead to complete stabilization of the mode. Nonlinear results show smaller saturated island widths for finite aspect ratio compared to the cylindrical limit. If the current channel is wide enough so as to produce steep gradients towards the outside of the plasma, both the finite aspect ratio cases and cylindrical cases disrupt.

24769 **(PPPL—1983) Conditioning of ion sources for mass spectrometry of plasmas.** Dylla, H.F.; Blanchard, W.R. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Feb 1983. Contract AC02-76CH03073. 23p. NTIS, PC A02/MF A01. Order Number DE83008978.

Mass spectrometry is a useful diagnostic technique for monitoring plasma species and plasma-surface interactions. In order to maximize the sensitivity of measurements of hydrogen-fueled fusion plasmas or hydrogen-based discharge cleaning and etching plasmas, the ion sources of mass spectrometers are operated at or near the high pressure limit of 10^{-4} Torr (10^{-2} Pa). Such high ambient pressures of hydrogen give rise to high background levels of residual gases such as H_2O, CO, and CH_4, due to surface reactions on the ion source electrodes. For a commonly used ion source configuration, the residual gas production is a linear function of the ambient H_2 pressure. Hydrogen conditioning can reduce the absolute residual gas levels. Steady-state residual gas production is observed in a conditioned ion source, which is related to a balance of diffusion and sorption on the electrode surfaces.

24770 **(PPPL—1985) Spectra of germanium and selenium in the 50-350 A region from the PLT tokamak plasma.** Stratton, B.C.; Hodge, W.L.; Moos, H.W.; Schwob, J.L.; Suckewer, S.; Finkenthal, M.; Cohen, S. (Johns Hopkins Univ., Baltimore, MD (USA). Dept. of Physics; Princeton Univ., NJ (USA). Plasma Physics Lab.). Mar 1983. Contract AC02-76CH03073. 23p. NTIS, PC A02/MF A01. Order Number DE83007970.

Spectra of germanium and selenium injected into the PLT tokamak plasma were observed in the 50 to 350 A region for GeXIV-XXV (KI to OI-like) and SeXVI-XXIV (KI to NaI-like). A number of 3p/sup k/-3p/sup k-1/3d transitions predicted by isoelectronic sequence extrapolation have been identified. Also, previously identified lines from ions in the AlI to OI-like and KI-like isoelectronic sequences have been observed in the tokamak plasma.

24771 **(PPPL—1986) Some novel features of the ordinary-mode electron-cyclotron resonance heating of tokamak plasmas.** Arunasalam, V.; Efthimion, P.C.; Hosea, J.C.; Hsuan, H.; Taylor, G. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Mar 1983. Contract AC02-76CH03073. 16p. NTIS, PC A02/MF A01. Order Number DE83008972.

It is shown that the finite k/sub parallel/ linear theory of absorption predicts: first, that the Doppler effect splits the k/sub parallel/ = o resonance into two closely spaced resonances instead of the usual Gaussian broadening; and second, that although the total absorption is due to the finite size of the electron Larmor orbits, it is mainly determined by T/sub parallel/ and is only weakly dependent on T/sub perpendicular/ via cyclotron overstability type terms. Some consequences of these unique features on plasma heating and rf current drive are also examined.

24772 **(PPPL—1989) Time-dependent drift Hamiltonian.** Boozer, A.H. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Mar 1983. Contract AC02-76CH03073. 21p. NTIS, PC A02/MF A01. Order Number DE83008982.

The lowest-order drift equations are given in a canonical magnetic coordinate form for time-dependent magnetic and electric fields. The advantages of the canonical Hamiltonian form are also discussed.

24773 (Rijnhuizen—82-140) Proposal for time-resolved ion temperature measurements by means of Rutherford scattering of the JET heating beams. Notermans, G.H.J.; Ven, H.W. van der; Brocken, H.J.B.M. (Stichting voor Fundamenteel Onderzoek der Materie, Jutphaas (Netherlands). Inst. voor Plasma-Fysica). Jan 1982. 24p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700730.

Portions are illegible in microfiche products2 figs., 14 refs., 2 tables.

A diagnostic method is discussed for measuring time-resolved ion temperatures in JET. The method is based on single Rutherford scattering of high energy neutral particles, injected into the plasma. In a previous report the possibilities of a multichord variant of the same method to obtain profile information was discussed. It appears that it is feasible to monitor the plasma ion temperature using only one detector line of sight. The JET neutral heating beams may be applied to provide the neutral particles. If the time-of-flight velocity detector is used in combination with the JET neutral injectors, a time resolution of 0.1 s can be achieved. This very compact detection system has an energy resolution of at least 160 at a flight path of 35 cm length. Calculations show a very low sensitivity of the device for background neutrons and gamma radiation. This, in combination with the short flight path, implies modest screening requirements.

24774 (SAI—254-83-386-LJ) Criterion for Baldwin instability in a symmetric tandem mirror with hot-electron end plugs. Tsang, K.T.; Hafizi, B.; Lee, X.S. (Science Applications, Inc., Boulder, CO (USA). Plasma Research Inst.). Feb 1983. Contract AC03-76ET53057. 14p. NTIS, PC A02/MF A01. Order Number DE83009112.

The stability of a symmetric tandem mirror with hot-electron end plugs against low-frequency modes is investigated using a model first proposed by Baldwin. The Baldwin instability, which is due to the coupling of a negative-energy mode in the plug and a shear Alfven mode in the center cell, is confirmed. It is found that this instability is confined to small ranges of value of L/sub c/, the length of the center cell. Under modest restriction of parameters, the unstable regions in L/sub c/ impose little limitation on L/sub c/.

24775 (SAND—82-1269C) Time-resolved measurements of hydrogen and deuterium fluxes in the ASDEX plasma boundary. Roth, J.; Varga, P.; Martinelli, A.P.; Scherzer, B.M.U.; Chen, C.K.; Wampler, W.R.; Taglauer, E. (Sandia National Labs., Albuquerque, NM (USA); Technische Univ., Vienna (Austria); Chinese Academy of Sciences, Peking. Inst. of Atomic Energy). 1982. Contract AC04-76DP00789. 23p. (CONF-820545—9). NTIS, PC A02/MF A01. Order Number DE82017025.

From 5. international conference on plasma surface; Gatlinburg, TN, USA (3 May 1982).

Portions are illegible in microfiche products.

Hydrogen and deuterium fluxes parallel to the toroidal magnetic field were measured in the plasma boundary of ASDEX using graphite collector probes. Time resolution of the order of 100 ms can be obtained by rotating the cylindrical probes behind an aperture during the discharge. The trapped amount of hydrogen was determined by subsequent thermal desorption; in the analyses of deuterium the D(^{3}He,p)^{4}He nuclear reaction was used. Both methods yield quantitative results. Measurements were done for limiter and divertor discharges in the range of 4 to 20 cm outside the limiter or separatrix. The time distributions show a maximum flux at the beginning and the end of the discharge. The relatively lower flux during the plateau phase of the discharge is in the range 10^{16} to 2 x 10^{17} cm^{-2} sec^{-1}, depending on the radial probe position; the maximum values are higher by a factor of 5 to 50. During neutral hydrogen injection, an additional maximum can be observed. The radial l/e-decay length is about 0.9 cm in front and 0.4 cm behind the fixed limiter. The results are compared with independent measurements in ASDEX and other plasma machines.

24776 (UCRL—88562) Quasi-optical ECRH beam system for MFTF-B. Yugo, J.J.; Shearer, J.W.; Ziolkowski, R.W.; Krause, K.H.; Berkey, J.H.; Fong, C.G. (Lawrence Livermore National Lab., CA (USA)). 1983. Contract W-7405-ENG-48. 6p. (CONF-830210—7). NTIS, PC A02/MF A01. Order Number DE83008593.

From 5. topical conference on radio frequency plasma heating; Madison, WI, USA (21 Feb 1983).

Multiple frequency electron cyclotron resonance heating (ECRH) is required in the anchor regions of MFTF-B. The requirement for a high transmission efficiency as well as some aspects of the operating environment make a quasi-optical transmission system attractive (neutron activation and damage of materials, x-rays, rf window coolant leaks, cryogenic temperatures, etc.). A quasi-optical transmission system increases the transmission efficiency and reduces the complexity of the hardware in the vacuum vessel. A beam transmission efficiency of 94 percent through the off-axis, fundamental electron cyclotron resonance position is achieved if the plasma density is limited to n/sub p/ less than 4 x 10^8 cm^{-3}. For MFTF-B parameters and ECRH at 28 GHz the electron mean free path for an ionizing collision is 5 x 10^6 cm so that most electrons will reach the wall prior to producing additional ionization of the background gas.

24777 Saturation of the lower-hybrid-drift instability by mode coupling. Drake, J.F.; Guzdar, P.N.; Huba, J.D. (University of Maryland, College Park, Maryland 20742). *Physics of Fluids;* **26**: No. 3, 601-604(Mar 1983).

A nonlinear mode-coupling theory of the lower-hybrid-drift instability is presented. It is found that the instability saturates by transferring energy from the growing, long wavelength modes to the damped, short wavelength modes. The saturation energy, mean square of the potential fluctuations, and diffusion coefficient are calculated self-consistently.

24778 Ion heating due to parametrically driven ion wave turbulence. Mizuno, K.; DeGroot, J.S. (Department of Applied Science, University of California, Davis, California 95616). *Physics of Fluids;* **26**: No. 3, 608-610(Mar 1983).

Ion heating is studied in an unmagnetized and nonisothermal plasma (T/sub e/0>>T/sub i/0). The ion temperature increases linearly with time while the ions sample the finite turbulence. The ions are significantly heated (T/sub i//T/sub i/0 > or $\approx$10) when ion wave turbulence is large (Δn/n> or $\approx$10%). The measured results agree with a simplified theory and one-dimensional particle simulation results.

24779 Ion-temperature-gradient instability in toroidal plasmas. Guzdar, P.N.; Chen, L.; Tang, W.M.; Rutherford, P.H. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Physics of Fluids;* **26**: No. 3, 673-677(Mar 1983). Contract AC02-76CH03073.

The stability of the ion-temperature gradient mode in a toroidal plasma is investigated. Using the ballooning-mode formalism, an ordinary difference-differential equation is derived which includes full kinetic effects. The equation is then examined in various limits where it reduces to an ordinary differential equation. Analytic and computational studies show that, for eta/sub i/ equivalentd ln T/sub i/ /d ln n>>1, toroidal effects further destabilize the mode. However, it is also found that toroidal effects give rise to higher eta/sub i/ threshold compared to the slab case. Extensive numerical calculations over a wide range of parameters are carried out to delineate the regions of instability. It is concluded that the eta/sub i/ instability is of relevance to present-day beam-heated tokamaks.

24780 Universal mode with diffusive electrons: linear instability and nonlinear saturation. Beasley, C.O. Jr.; Molvig, K.; van Rij, W.I. (Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physics of Fluids;* **26**: No. 3, 678-683(Mar 1983). Contract W-7405-ENG-26.

The effect of spatial electron diffusion on the stability properties of the universal drift mode in a sheared magnetic field are studied using an initial value code, TEDIT. In previous studies of this problem Hirshman and Molvig relied on an approximation to

the electron resonance function equivalent to making a Krook approximation for the spatial diffusion operator, D partial²/partialx². The present work treats the diffusion operator precisely and also allows the treatment of a realistic parallel velocity dependence of the diffusion coefficient, D = D(v/sub parallel/). For the case of a velocity-independent diffusion coefficient, the qualitative features found by Hirshman and Molvig are observed. The modes with k/sub y/rho/sub i/>1 destabilize at small values of the diffusion coefficient and saturate at higher values, corresponding to several orders of magnitude in D. There are quantitive discrepancies with the previous work that, near the saturation point, can be accounted for reasonably well by a simple asymptotic theory. However, when the code uses a more realistic form, D = D_0 (v/sub c//'v/sub parallel/') exp(-v²/sub c//v²/sub parallel/)+D/sub c/, where D/sub c/ corresponds to the (small) collisional diffusion, and D_0 parametrizes the turbulence level, then a quantitative difference is observed. Instability persists down to zero turbulence levels, $D_0 = 0$. This is essentially linear instability due to collisional diffusion alone.

24781 **Integral representation for geometric optics solutions.** Hazak, G.; Bernstein, I.B.; Smith, T.M. (Department of Applied Physics, Yale University, New Haven, Connecticut 06520). *Physics of Fluids;* **26**: No. 3, 684-688(Mar 1983).

An integral representation of the geometric optics solutions for the field of dressed particles in inhomogeneous plasma is derived. The representation is a natural generalization of the Fourier integral used for homogeneous systems. The set of plane waves is replaced by a complete orthogonal set of "quasiplane waves" which in practice may be constructed by using the existing ray tracing codes.

24782 **Quasilinear momentum and energy transport.** Mahajan, S.M.; Hazeltine, R.D.; Hitchcock, D.A. (Fusion Research Center, The University of Texas, Austin, Texas 78712). *Physics of Fluids;* **26**: No. 3, 700-704(Mar 1983). Contract FG05-80ET53088;AC05-76ET53036.

The equations of quasilinear momentum and energy transport are studied to show that a suprathermal level of low-frequency fluctuations can cause highly enhanced electron energy transport without effectively changing the plasma resistivity.

24783 **Effect of a transition between regular and stochastic electron motion on the evolution of an obliquely propagating Langmuir wave.** Menyuk, C.R. (Laboratory for Plasma and Fusion Energy Studies, University of Maryland, College Park, Maryland 20742). *Physics of Fluids;* **26**: No. 3, 705-723(Mar 1983). Contract AM03-76SF00010.

The evolution of an obliquely propagating Langmuir wave is considered, with emphasis on determining the effect of a transition between regular and stochastic electron motion. The wave has three distinct evolution regimes, whose locations in parameter space depend roughly on the relative sizes of the linear damping rate γ, the electron bounce frequency ω/sub b/ and the electron cyclotron frequency Ω. When ω/sub b/<γ, the wave is in the linear regime and simply damps away. When $\gamma<\omega$/sub b/<Ω, the wave evolution is dominated by regular, trapped electron motion in individual resonances. It is shown that when the propagation angle increases to about 14°, the trapping oscillations present in parallel propagating waves disappear due to phase mixing of the different bounce frequencies. When $\gamma<\Omega<\omega$/sub b/, the wave evolution is dominated by stochastic particle motion from resonance to resonance. It is shown that when a transition is made from the trapping to the stochastic regime, the final (t = ∞) wave amplitude significantly decreases, due to the increased ability of the electrons to take energy from the wave. Finally, simulation results which verify key aspects of the theory are reported.

24784 **Alfven wave heating in general toroidal plasmas.** Bernstein, I.B. (Department of Applied Physics, Yale University, New Haven, Connecticut 06520). *Physics of Fluids;* **26**: No. 3, 730-740(Mar 1983).

A variational formulation is presented within the framework of linearized ideal magnetohydrodynamics of the problem of the heating of a general toroidal plasma by Alfven waves. The extremal value of the functional yields directly the impedance matrix seen by the driving circuits. The problem is couched in generalized coordinates in a fashion amenable to computational implementation. The energy is absorbed in boundary layers which straddle those magnetic surfaces corresponding to continuum eigenfunctions resonant with the driving frequency. The contribution of these resonant surfaces to the extremal value of the variational functional is given explicitly in terms of quantities which must be found by solving the problem in the regions external to the resonant surfaces. The structure of the theory suggests optimum ways of implementing the method.

24785 **Synchrotron emission from a relativistic loss-cone distribution with application to the ELMO Bumpy-Torus Experiment.** Winske, D.; Boyd, D.A. (Laboratory for Plasma and Fusion Energy Studies, University of Maryland, College Park, Maryland 20742). *Physics of Fluids;* **26**: No. 3, 755-765(Mar 1983).

Analytic expressions for the power emitted per unit volume per solid angle per unit frequency at perpendicular propagation as synchrotron radiation from a relativistic loss-cone distribution of electrons are derived and compared with exact numerical results. These expressions are useful for understanding how the radiation scales and for inferring properties of the plasma from measurements of the radiation. As an example, it is shown that the temperature and loss-cone angle of the electron distribution in the ELMO Bumpy Torus (EBT) ring can be determined in a straightforward fashion from the ratio of radiation in the two polarizations at two frequencies. Also, it is demonstrated that the loss-cone angle can be determined from the frequency at which this emission ratio is a minimum, even if the emission ratio itself cannot be measured very accurately.

24786 **Tearing modes in a general cross-section force-free cylindrical tokamak.** Lee, J.K.; Chu, M.S.; Helton, F.J. (General Atomic Company, San Diego, California 92138). *Physics of Fluids;* **26**: No. 3, 766-774(Mar 1983). Contract AT03-76ET51011.

The stability of magnetohydrodynamic tearing modes for a large aspect ratio force-free tokamak with general cross section is studied in terms of an energy principle. Determinations of the marginal stability boundary Δ' and island size using this general two-dimensional method give good agreement with those of known methods for circular equilibria. Results for noncircular equilibria are also presented.

24787 **Measurement of growth rate of plasma drift wave excited by slow electrons.** Barrett, P.J.; Allen, G.R. (Plasma Physics Research Institute, University of Natal, Durban, South Africa). *Physics of Fluids;* **26**: No. 3, 795-796(Mar 1983). Contract AC02-76CH03073.

Measurements are presented on drift waves which are driven unstable by an annular beam of slow electrons. The growth rate of the most unstable mode varies linearly with the injection velocity of the beam, in accordance with fluid theory.

24788 **Plasma convection and line-tying.** Fornaca, S. (Physics Department, University of California, Irvine, California 92717). *Physics of Fluids;* **26**: No. 3, 797-804(Mar 1983). Contract AM03-76SF00034;AT03-76ET53026.

The directed motion of a low-β plasma across a toroidal magnetic field is examined as the degree of electrical contact between the plasma and a conducting end wall (line-tying) is varied in a controlled manner. Experimentally, little difference is found between the motion of a completely isolated plasma and that of a plasma in contact with a wall that does not emit electrons. As the degree of line-tying is increased by making the end wall electron-emitting, the cross-field convection of the plasma is increasingly suppressed. Beyond a critical emission current density, no further suppression is observed. When the system is in the surface-line-tying configuration, the suppression of the directed cross-field motion is accompanied by a large increase in the radial transport of plasma.

24789 **Influence of collisions and incoherence on ion-cyclotron transport in mirror plasmas.** Cohen, B.I.; Cohen, R.H.; Rognlien, T.D. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physics of Fluids;* **26**: No. 3, 808-819(Mar 1983). Contract W-7405-ENG-48.

The effects of classical Coulomb collisions and wave incoherency on drift-cyclotron-loss-cone (drift-cone) mode anomalous transport are studied analytically and by simulation. Pitch-angle collisions have a cumulative effect on the gyrophase angle, and the spatially varying magnetic field in a mirror well contributes a large geometrical amplification of the gyrophase-angle diffusion. Analytical calculations of this effect for particles with arbitrary pitch angle are confirmed by Monte Carlo simulations. However, for the levels of drift-cone turbulence observed in the 2XIIB magnetic mirror experiment and for its relative collisionality, the effect of pitch-angle collisions on anomalous transport is small. In particular, heating of ions to 40 keV energies cannot be explained by this mechanism. Wave incoherency also destroys superadiabaticity, leads to velocity transport, and provides an approximate model of the finite frequency bandwidth of drift-cone turbulence, e.g., due to bursting effects in 2XIIB. Monte Carlo simulations corroborate the analytical transport theory presented. The simulations exhibit significantly enhanced velocity-space transport and heating of ions to nearly 40 keV energies due to wave incoherency for parameters at the limit of applicability to the 2XIIB experiment. These same considerations of resonant wave-particle interactions are also directly relevant to electron and ion-cyclotron resonance heating and to velocity diffusion driven by unstable Alfven-ion-cyclotron waves in other mirror experiments.

24790 **Electron confinement studies on the EBT-S Bumpy Torus Experiment using soft x-ray techniques.** Hillis, D.L.; Haste, G.R.; Berry, L.A. (Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physics of Fluids;* **26**: No. 3, 820-829(Mar 1983). Contract W-7405-ENG-26.

Soft x-ray bremsstrahlung measurements have been performed on the ELMO Bumpy Torus (EBT-S) plasma to determine the electron temperature T/sub e/ and electron density density n/sub e/ using a calibrated Si(Li) detector over a wide range of operating conditions. The purpose of this paper is to outline the necessary assumptions and essential x-ray techniques that are inherent in soft x-ray measurements in order to investigate the electron heating and confinement properties of EBT-S. In addition, by utilizing the electron density as determined by the soft x-ray measurements, the previous EBT-S confinement analyses have been extended. The steady-state plasma of EBT-S is heated by microwaves using a continuous wave (cw) gyrotron that can operate up to power levels of 200 kW. From the soft x-ray measurements, both the electron temperature and density are found to increase at higher microwave power levels. For operation at microwave power levels of 200 kW, T/sub e/ approaches 1 keV while n/sub e/ approaches 1.2×10^{12} cm^{-3}. In general, confinement properties are found to improve with increased microwave power. The data are compared with neoclassical transport scaling and the electron transport is found to be collisionless ($\nu/\Omega < 1$) as well as neoclassical.

24791 **Reply to the Comments of B. K. Shivamoggi.** Lau, Y.Y.; Liu, C.S. (Science Applications, Inc., McLean, Virginia 22102). *Physics of Fluids;* **26**: No. 3, 868(Mar 1983).

A reply is made to comments on "Stability of Shear Flow in a Magnetized Plasma". (AIP)

24792 **Flux loss and heating during the formation of a field-reversed configuration.** Sgro, A.G.; Armstrong, W.T.; Lipson, J.; Tuszewski, M.G.; Cochrane, J.C. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] A: General Physics;* **26**: No. 6, 3564-3566(Dec 1982).

The simulated time evolution of magnetic field profiles and trapped flux in a field-reversed configuration, when compared with the experiment, implies that the rapid decay of the initial reversed flux is due to a resistivity that is anomalously enhanced over its classical value. A tenuous plasma between the field-reversed configuration and the wall carries a significant fraction of the current, and about half of the anomalous Joule heating must be deposited directly in the ions in order to calculate the correct ion temperature. The fractional flux retention is most sensitive to an increase of applied bias field.

24793 **Calculation of hydrogen density in toroidal plasma.** Hogan, J.T. (Oak Ridge National Lab., TN (USA)). *Journal of Nuclear Materials;* **111**: 413-419(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Calculation of hydrogen recycling in toroidal plasmas (tokamaks, stellarators) requires three-dimensional spatial models. We present numerical results for the distribution of H^0 in the torus for a number of typical examples: standard limiter in a tokamak, stellarator with uniform wall emission, neutral-beam stimulated ('halo') neutrals, axisymmetric tokamak with a gettered surface, and a pump-limiter with the dimensions of that tried on ISX-B. We find that spatial asymmetries are pronounced, as expected from previous experimental work. The asymmetric spatial distribution is needed to calculate radiative emission from low-Z impurities (e.g., carbon and oxygen) which are strongly influenced by impurity thermal charge exchange.

24794 **Numerical analysis of plasma-wall interaction for an oblique magnetic field.** Chodura, R. (Association Euratom-Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 420-423(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

A numerical code is used to calculate energy and incidence angle of plasma ions and electrons impinging on an absorbing wall. Plasma particles coming from a plasma of given density and temperature traverse a transition layer with an electric space charge field perpendicular to the wall and a given magnetic field of arbitrary angle before being adsorbed in the wall. The 1d electrostatic particle code determines the electric field and the change of particle velocity distributions in the transition layer. When the incidence angle psi of the magnetic field is varied from 0^0 (normal) to 90^0 (tangential), the impact energies W of ions and electrons at the wall stay nearly unchanged. Electrons reach the wall according to an isotropic Maxwellian distribution except for large angles psi where only electrons travelling along the magnetic field have a chance to escape the plasma. Ions hit the wall at increasing angles theta for increasing psi. The incidence angle of cold ions (Tsub(i0) = 0) is always steeper than that of the magnetic field. For nearly grazing incidence angle of the magnetic field psi $\rightarrow 90^0$ the ion incidence angle theta becomes grazing as well. After the distribution function is determined the sputtering yield of wall incident ions is calculated for different magnetic field angles psi showing maximum yield for psi near to 90^0.

24795 **Thermal stability of peripheral plasmas.** Ashby, D.E.T.; Hughes, M.H. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.). *Journal of Nuclear Materials;* **111**: 454-456(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

It is concluded that the thermal stability of the peripheral plasma depends on the details of the radiation mechanism. Whereas simple 'coronal equilibrium' can lead to instability both charge-exchange recombination and the diffusion of individual charge states are stabilizing influences; neither greatly enhances the magnitude of the impurity radiation.

24796 **Review of the plasma-material interaction problems for reacting and burning plasma experiments.** Miyahara, A. (Nagoya Univ. (Japan). Inst. of Plasma Physics). *Journal of Nuclear Materials;* **111**: 461-478(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

With 80 refs.

Serious problems have to be faced at present in linking present plasma research to fusion reactor engineering. Even in fusion devices of the near-term and of the next generation which aim to evaluate the fusion engineering feasibility of burning plasma experiments such as TFTR, JET, R-tokamak, ZEPHYR and INTOR, plasma-material interactions cause many technological difficulties such as large heat loads, large erosion rates, large magnetic forces and large induced radioactivities. Moreover, impurity control, tritium handling, ash exhaust and refuelling need to be solved by realistic methods with technological justifications. Since present fusion approaches might not give hopeful predictions to an economical, safe, and reliable fusion reactor, it is most important at present to find a possible window of promising fusion research. In this paper, we review technological restrictions from viewpoints of plasma-material interactions, then discuss the fusion research and related material investigations that are necessary to realize reasonable fusion reactor concepts.

24797 **Extended local mixing model for hydrogen retention and isotope exchange.** Brice, D.K.; Doyle, B.L.; Wampler, W.R. (Sandia National Labs., Albuquerque, NM (USA)). *Journal of Nuclear Materials;* **111**: 598-605(Nov-Dec 1982). Contract AC04-76DP00789.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The previously reported local mixing model (LMM) for hydrogen retention and isotope exchange is extended to include thermal release of the hydrogen from its trap sites. In addition, a new mechanism for beam-enhanced thermal transport (BETT) is described which accounts for a major portion of the thermal release at elevated temperatures. BETT involves the beam-induced promotion of trapped hydrogen from stronger traps to weaker traps and arises naturally from the basic concepts of the LMM. Comparison of the predictions of the model for hydrogen retention and isotope exchange at elevated temperatures in graphite and TiC show good agreement between experiment and theory.

24798 **Simple theory for maximum H inventory and release: a new transport parameter.** Doyle, B.L. (Sandia National Labs., Albuquerque, NM (USA)). *Journal of Nuclear Materials;* **111**: 628-635(Nov-Dec 1982). Contract AC04-76DP00789.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

A simplified theory of hydrogen transport in materials is presented. The problem is formulated in terms of a dimensionless transport parameter, W = R(phiK$_o$)sup(1/2)/D where R is the projected range, phi is the incident penetrating flux, K$_o$ is a phenomenological recombination coefficient and D is the diffusion coefficient for hydrogen in the material. Using this parameter, equations which describe recycle times, maximum hydrogen inventory and maximum hydrogen permeation are derived. This treatment yields simple analytic expressions for these quantities which are shown to be excellent approximations to the behavior obtained from exact numerical solutions. This transport parameter further results in a natural classification of the different types of behavior of hydrogen in materials.

24799 **Plasma wake of mesosonic conducting bodies. Pt. 2. An experimental parametric study of the mid-wake ion density peak.** Stone, N.H. (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center). *Journal of Plasma Physics;* **26**: 385-397(Dec 1981).

An experimental investigation of the disturbed flow field created by conducting bodies in a mesosonic, collisionless plasma stream is reported. Part 1 dealt with ion focusing by the body's plasma sheath and the subsequent filling of the near-wake void region. In part 2, the mid-wake region is investigated, where, for bodies of the order of a Debye length in size, the focused ion streams converge to form a significant current density peak on the wake axis. A parametric description is obtained of the behaviour of the amplitude, width, and position of this peak. The results also indicate that portions of the axial ion peak are created by additional mechanisms and that body geometry affects the mid-wake structure only when the sheath is sufficiently thin to conform to the shape of the body.

24800 **Nonlinear electrostatic waves: oblique propagation.** Jackson, R.W. (Northeastern Univ., Boston, MA (USA)). *Journal of Plasma Physics;* **26**: 399-406(Dec 1981).

The fluid equations for electrostatic wave forms propagating at small angles to a constant magnetic field are investigated. Both ion cyclotron and charge separation effects are included. Numerical results are given for initial conditions which are consistent with soliton formation. These results show a hybrid nonlinear wave form containing oscillations which are identified as short-wavelength fast ion-acoustic waves and long-wavelength slow ion-acoustic waves. An approximate analytic analysis is performed using the Bogoliubov-Krylov-Mitropolskii perturbation method.

24801 **Nonlinear theta-pinch equilibria.** Abraham-Shrauner, B. (Washington Univ., St. Louis, MO (USA). Dept. of Electrical Engineering). *Journal of Plasma Physics;* **26**: 419-430(Dec 1981).

Analytic solutions for cylindrical, rigid-drift equilibria are searched for by checking the invariance of the second-order, nonlinear differential equations of the line density and particle density under one-parameter Lie groups. No invariance was found for the cylindrical screw-pinch for the polytrope index γ is not equal to 2 of the pressure equation of state. For the Z-pinch, the differential equation for the line density for arbitrary γ is invariant under one group and reduces by Euler's method to an intractable first-order, nonlinear differential equation. In the case of a theta-pinch, the nonlinear differential equations for the particle density and line density are invariant at least under the translation group. The particle density is found as an implicit function of the radial distance r, involving incomplete beta functions of the γth power of the particle density.

24802 **Equilibrium and stability of collisionless systems in the paraxial limit.** Newcomb, W.A. (California Univ., Livermore (USA). Lawrence Livermore National Lab.; California Univ., Davis (USA). Dept. of Applied Science). *Journal of Plasma Physics;* **26**: 529-584(Dec 1981).

A study is made of the equilibrium and stability of a magnetically confined collisionless plasma in the paraxial or 'long, thin' limit. The main field is poloidalaxisymmetric, and a stabilizing quadrupole field is superimposed.

24803 **Effects of toroidal field ripple on suprathermal ions in tokamak plasmas.** Goldston, R.J.; Towner, H.H. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Plasma Physics;* **26**: 283-307(Oct 1981).

Analytic calculations of three important effects of toroidal field ripple on suprathermal ions in tokamak plasmas are presented. In the first process, collisional ripple-trapping, ions become trapped in local magnetic wells near their banana tips owing to pitch-angle scattering as they traverse the ripple on barely unripple-trapped orbits. In the second process, collisionless ripple-trapping, ions are captured (again near a banana tip) owing to their finite orbits, which carry them out into regions of higher ripple. In the third process, banana-drift diffusion, fast-ion banana orbits fail to close precisely, due to a ripple-induced 'variable lingering period' near the banana tips. These three mechanisms lead to substantial radial transport of banana-trapped, neutral-beam-injected ions when the quantity α^* is identical with epsilonsinthetaNqdelta is of order unity or smaller.

24804 **Stability of parallel flow of a multi-component cylindrical plasma to electrostatic perturbations.** Lucas, R.J. (Illinois Inst. of Tech., Chicago (USA). Dept. of Mathematics). *Journal of Plasma Physics;* **26**: 369-383(Oct 1981).

Sufficient conditions for the stability of parallel flow of a warm N-component cylindrical plasma to electrostatic perturbations are obtained. In the unperturbed state the jth plasma component is assumed to have axial velocity Vsub(j0)(r), r being the radial co-ordinate, and the equilibrium quantities are permitted to be arbitrary functions of r consistent with the zeroth-order equations. The L$_2$-norms of certain system variables are shown to be bounded uni-

formly in time. Circle theorems are obtained for the complex eigenfrequencies of any normal mode.

24805 **Temporal development of a plasma sheath.** Cipolla, J.W. Jr.; Silevitch, M.B. (Northeastern Univ., Boston, MA (USA)). *Journal of Plasma Physics;* 25: 373-389(Jun 1981).

A study is presented of a one-dimensional model for the time-dependent behaviour caused by placing an uncharged conducting surface in contact with a uniform equilibrium plasma. Both the probe potential and plasma response are unknown a priori but are specified through a set of self-consistent model equations and boundary conditions. Some numerical and analytical consequences of this model are investigated.

24806 **Statistical acceleration of electrons by lower-hybrid turbulence.** Wu, C.S. (Maryland Univ., College Park (USA). Inst. for Physical Science and Technology); Gaffey, J.D. Jr. (Naval Research Lab., Washington, DC (USA)); Liberman, B. (Rio Grande do Sul Univ., Porto Alegre (Brazil). Inst. de Fisica). *Journal of Plasma Physics;* 25: 391-401(Jun 1981).

The statistical acceleration of electrons along an ambient magnetic field by large-amplitude lower-hybrid turbulence is discussed. Perturbations driven by a cross-field current and propagating nearly perpendicular to the applied magnetic field are considered. It is assumed that the instability saturates rapidly and that the fluctuating electric field is predominantly electrostatic. The quasilinear diffusion equation is solved using a Green's function technique, assuming a power law spectral energy density. The time evolution of an initial Maxwellian distribution is given and the time rate of change of the mean electron energy is calculated for various cases.

24807 **Relativistic effects on strong Langmuir turbulence.** Freund, H.P. (Science Applications, Inc., McLean, VA (USA)); Liu, C.S. (Maryland Univ., College Park (USA). Dept. of Physics and Astronomy); Kulsrud, R.M. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Plasma Physics;* 25: 465-477(Jun 1981).

The relativistic effects on strong Langmuir turbulence which arise from both relativistic plasma temperatures and high-amplitude oscillations are considered. When relativistic effects arise primarily from high plasma temperature, a kinetic formalism is employed and a nonlinear Schroedinger equation is derived from expansion of the Vlasov-Maxwell equations. A fluid treatment is used when the relativistic effects of high wave amplitudes predominate. Here, ion dynamics are ignored and the relativistic electron mass correction results in the same type of three-dimensional phase-amplitude coupling as in the kinetic analysis. A Lagrangian formalism for each limiting case is described which leads to a virial theorem from which thresholds for collapse of arbitrary wave packets can be derived.

24808 **Kinetic analysis of electromagnetic wave backscattering in a magnetized plasma.** Willett, J.E.; Bilikmen, S. (Missouri Univ., Columbia (USA). Dept. of Physics). *Journal of Plasma Physics;* 25: 479-490(Jun 1981).

An analysis is presented which describes the stimulated backscattering of an electromagnetic wave with frequency large compared with the electron cyclotron frequency and the electrostatic scatterer wave frequency. The electron and ion susceptibilities provided by kinetic theory are employed in convenient approximations valid at moderate temperatures. Formulae are derived which permit calculation of the growth rate and threshold in bounded and unbounded plasmas. A numerical study of the effects of a static magnetic field on the stimulated backscattering of a carbon dioxide laser beam in a hydrogen plasma is included.

24809 **Arc notching on PDX neutral beams.** Katz, M.; Segers, C. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 806(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

24810 **Hardening of instruments for fusion reactors.** Baur, J.F.; Miller, P.H. Jr. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 960(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

24811 **Possible steady state current drive for reversed field pinch discharges.** Schoenberg, K.F.; Gribble, R.F. (Los Alamos Natl Lab, NM, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1923(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A steady state current drive concept applicable to reversed field pinch (RFP) discharges is presented. The concept, initially proposed by M. Bevir and J. Gray of the Culham Laboratory, entails driving the RFP's toroidal and poloidal magnetic field circuits with low-frequency oscillating voltage sources. The steady state drive concept was examined with a O-D plasma-circuit simulation code presently employed to model the Los Alamos ZT-40 RFP experiment. Simulations indicate the drive concept is feasible provided its perturbative effect on plasma equilibrium, stability, and transport is minimal A summary of these results, along with their implications on present and future RFP devices, is discussed.

24812 **Impurity detection in the APEX tokamak by in-situ doppler shift laser fluorescence spectroscopy.** Pellin, M.J.; Young, C.E.; Gruen, D.M.; Norem, J.H. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1684-1687(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Laser fluorescence spectroscopy (LFS) is a promising impurity atoms generated from surfaces exposed to fusion plasmas. Here the first continuous wave laser fluorescene measurement of impurities generated during a single tokamak pulse is reported. The results point out the promise of LFS as an essentially real time, in-situ diagnostic allowing a detailed comparison of impurity generation and transport with Tokamak parameters and operating conditions. Results presented will include the Zr-atom density and velocity distribution produced from a Zr-metal target during an Apex Tokamak discharge.

24813 **Studies of fusion product confinement and heating in EBT reactors.** Driemeyer, D.E.; DeVeaux, J.C. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 475-478(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In order to evaluate means of enhancing alpha confinement, the Monte Carlo particle code MCFRM has been modified to represent EBTR (Elmo Bumpy Torus Reactor) geometry. The use of this transport code will serve as a stochastic check to the confinement calculations presented in the ebtr design study as well as introducing slowing-down dynamics into the problem of retaining fusion product energy. The modified version of MCFRM, renamed MCEBTR (Monte Carlo Elmo Bumpy Torus Reactor), tracks individual alpha particle trajectories in representative EBTR magnetic geometries. This paper deals in greater detail with the numerical modelling of MCEBTR and the initial results derived from it.

24814 **Optimal neutral beam heating scenario for FED.** Hively, L.M.; Houlberg, W.A.; Attenberger, S.E. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 715-718(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Optimal neutral beam heating scenarios are determined for FED based on a 1/one-half/-D transport analysis. Tradeoffs are examined between neutral beam energy, power, and species mix for positive ion systems. A ramped density startup is found to provide

the most economical heating. The resulting plasma power requirements are reduced by 10-30% from a constant density startup. For beam energies between 100 and 200 keV, the power needed to heat the plasma does not decrease significantly as beam energy is increased. This is due to reduced ion heating, more power in the fractional energy components, and rising power supply requirements as beam energy increases.

24815 **For the PDX CO/sub 2/ laser experiment. Optical mounts and shutter-window-grating system design.** Bohr, A.H. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1717-1720(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Mechanical design for the PDX CO/sub 2/ Laser Experiment required provision for an optical table on the basement level for laser and source optics, a beam turning table at the same level, and above it (and just below the vacuum vessel), a Shutter-Window-Grating-Assembly. A similar assembly repeated just above the vacuum vessel. Above this a boom supported detector platform terminates the system optics. The optical table was commercially procured and the turning table designed and fabricated at the Laboratory. The Shutter-Window-Grating-Assemblies contained compact mechanical shutters to protect the vacuum windows, remote operated grating rotators (flexible cable drive, and integral mirrors for initial calibration. The detector platform supporting boom was made from non-metallic material with non-magnetic fasteners to eliminate machine magnetic field forces. The boom was also mechanically isolated from the work platform and adjacent diagnostic to minimize vibration effects.

7002 Fusion Power Plant Technology

REFER ALSO TO CITATION(S) 23922, 23992, 24020, 24021, 24119, 24132, 24164

24816 **(ANL/FPP—82-1) Demonstration tokamak-power-plant study (DEMO).** (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 913p. NTIS, PC A99/MF A01. Order Number DE83008919.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A study of a Demonstration Tokamak Power Plant (DEMO) has been completed. The study's objective was to develop a conceptual design of a prototype reactor which would precede commercial units. Emphasis has been placed on defining and analyzing key design issues and R and D needs in five areas: noninductive current drivers, impurity control systems, tritium breeding blankets, radiation shielding, and reactor configuration and maintenance features. The noninductive current drive analysis surveyed a wide range of candidates and selected relativistic electron beams for the reference reactor. The impurity control analysis considered both a single-null poloidal divertor and a pumped limiter. A pumped limiter located at the outer midplane was selected for the reference design because of greater engineering simplicity. The blanket design activity focused on two concepts: a Li_2O solid breeder with high pressure water cooling and a lead-rich Li-Pb eutectic liquid metal breeder (17Li-83Pb). The reference blanket concept is the Li_2O option with a PCA structural material. The first wall concept is a beryllium-clad corrugated panel design. The radiation shielding effort concentrated on reducing the cost of bulk and penetration shielding; the relatively low-cost outborad shield is composed of concrete, B_4C, lead, and FE 1422 structural material.

24817 **(ANL/FPP/TM—162) Alternate-fuel reactor studies.** Evans, K. Jr.; Ehst, D.A.; Gohar, Y.; Jung, J.; Mattas, R.F.; Turner, L.R. (Argonne National Lab., IL (USA)). Feb 1983. Contract W-31-109-ENG-38. 66p. NTIS, PC A04/MF A01. Order Number DE83009478.

A number of studies related to improvements and/or greater understanding of alternate-fueled reactors is presented. These studies cover the areas of non-Maxwellian distributions, materials and lifetime analysis, a ^{3}He-breeding blanket, tritium-rich startup effects, high field magnet support, and reactor operation spanning the range from full D-T operation to operation with no tritium breeding.

24818 **(ANL/FPP/TM—168) Tokamak reactor cost model based on STARFIRE/WILDCAT costing.** Evans, K. Jr. (Argonne National Lab., IL (USA)). Mar 1983. Contract W-31-109-ENG-38. 36p. NTIS, PC A03/MF A01. Order Number DE83009477.

A cost model is presented which is useful for survey and comparative studies of tokamak reactors. The model is heavily based on STARFIRE and WILDCAT costing guidelines, philosophies, and procedures and reproduces the costing for these devices quite accurately.

24819 **(CONF-810812—48) Key features of INTOR nuclear systems.** Abdou, M.A. (Argonne National Lab., IL (USA)). May 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007908.

From 16. intersociety energy conversion engineering conference (IECEC); Atlanta, GA, USA (9 Aug 1981).

Portions are illegible in microfiche products.

The conceptual design effort for INTOR was broadly defined in three areas: (1) Plasma Physics, (2) Engineering, and (3) Nuclear Systems. This paper is devoted to a summary of the Nuclear Systems effort. The emphasis is placed on the First Wall, Breeding Blanket, and Divertor.

24820 **(CONF-810831—103) Important material considerations in INTOR.** Abdou, M.A.; Mattas, R.F.; Smith, D.L. (Argonne National Lab., IL (USA); Wisconsin Univ., Madison (USA)). 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007942.

From 2. fusion reactor materials meeting; Seattle, WA, USA (9 Aug 1981).

Portions are illegible in microfiche products.

A number of important material-related problems were identified and analyzed during the Phase-I study for INTOR. The first wall and divertor collector plate are subjected to severe normal and off-normal conditions. A melt layer is predicted to develop in a bare stainless steel wall under plasma disruptions. Graphite tiles will not melt but they introduce other serious uncertainties into the design. The design strategy for the divertor collector plate focused on separating the surface and high heat flux problems and on utilizing a novel mechanical design concept for attaching tungsten tiles to a stainless steel (or copper) heat sink.

24821 **(CONF-811040—198) 10-kA pulsed power supply for superconducting coils.** Ehsani, M.; Fuja, R.E.; Kustom, R.L. (Texas A and M Univ., College Station (USA); Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83008537.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A new 4-MW inductor-converter bridge (ICB) for supplying power to pulsed superconducting magnets is under construction at Argonne National Laoratory. This is a second-generation ICB built at Argonne Lab. The analytical, design, and control techniques developed for the first prototype have been used in the design of the new system. The paper presents the important considerations in the design of the new ICB. A brief description of the operation of the circuit is also given.

24822 **(CONF-811040—199) Development of the rf linear accelerator test bed for heavy-ion fusion.** Watson, J.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83008673.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The amount of absorbed energy required by high gain deuterium-tritium targets for inertial confinement fusion reactors is now projected to be greater than 1 Megajoule. It has become apparent that a heavy ion fusion driver is the preferred choice in this scenario. To demonstrate this accelerator-based option, the national program has established two test beds: one at Argonne for the rf linac/storage ring approach, and one at Lawrence Berkeley Laboratory developing an induction linac. The Argonne Beam Development Facility (BDF) would consist of a 40 mA rf linac for Xe^{+1}, a stor-

age ring, and a 10 GeV synchrotron. The design and status of the BDF is described as well as future program options to demonstrate as many solutions as possible of the issues involved in this approach.

24823 **(CONF-811040—200) Conceptual design of the INTOR first-wall system.** Smith, D.L.; Majumdar, S.; Mattas, R.F.; Turner, L.; Jung, J.; Abdou, M.A.; Bowers, D.; Trachsel, C.; Merrill, B. (Argonne National Lab., IL (USA); McDonnell Douglas Astronautics Co., St. Louis, MO (USA); EG and G Idaho, Inc., Idaho Falls (USA)). Oct 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008509.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Portions are illegible in microfiche products.

The design concept and performance characteristics of the first-wall design for the phase-I INTOR (International Tokamak Reactor) study is described. The reference design consists of a water-cooled stainless steel panel. The major uncertainty regarding the performance of the bare stainless steel wall relates to the response of a thin-melt layer predicted to form on limited regions during a plasma disruption. A more-complex backup design, which incorporates radiatively cooled graphite tiles on the inboard wall, is briefly described.

24824 **(CONF-811040—201) Neutronic analysis of graphite-moderated solid breeder design for INTOR.** Jung, J.; Abdou, M.A. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007644.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Portions are illegible in microfiche products.

An in-depth analysis of the INTOR tritium-production-blanket design is presented. A ternary system of solid silicate breeder, lead neutron multiplier, and graphite moderator is explored primary from safety and blanket tritium-inventory considerations. Lithium-silicate (Li_2SiO_3) breeder systems are studied along with water (H_2O/D_2O) and Type 316 stainless steel as coolant and structural material, respectively. The analysis examines the neutronics effects on tritium-production regarding: (1) coolant choice; (2) moderator choice; (3) moderator location; (4) multiplier thickness; (5) ^{6}Li enrichment; and (6) ^{6}Li burnup. The tritium-breeding-blanket modules are located at the top, outboard, and bottom (outer) parts of the torus, resulting in a breeding coverage of $\sim$ 60% at the first-wall surface. It is found that the reference INTOR design yields, based on a three-dimensional analysis, a net tritium breeding ratio (BR) of $\sim$ 0.65 at the beginning of reactor operation, satisfying the design criterion of BR $>$ 0.6.

24825 **(CONF-811103—128) Analysis of the separation of protium from blanket tritium-product streams.** Misra, B.; Maroni, V.A. (Argonne National Lab., IL (USA)). Jul 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007946.

From ANS winter meeting; San Francisco, CA, USA (29 Nov 1981).

The case is considered in which the blanket product stream has been purified to the point where only protium, tritium, and a small quantity of deuterium remain. A cryogenic distillation cascade concept developed specifically to handle this enrichment problem is shown. The concept is based on a series of distillation columns and equilibrators capable of producing a protium-rich stream containing less than 1000 appm T and a tritium-rich stream containing less than 2000 appm H. It is envisioned that both of these streams could be blended with streams of comparable composition in the mainstream position of the fuel cycle without further processing. The computational analysis of the cascade was based on a fixed arrangement of columns and equilibrators and a fixed number of theoretical plates per columns, since these features are less easily varied in an actual system than reflux ratios and flow rates. In order to test the flexibility of this conceptual enruchment system to adjust to variations of the H/T ratio in the feed, H/T values of 0.333, 1.00, and 3.00 were investigated.

24826 **(DOE/DP/40162—1) Transport effects with hot electrons in laser fusion. Final report, October 1, 1981-February 28, 1983.** Shkarofsky, I.P. (MPB Technologies, Inc., Ste-Anne-de-Bellevue, Quebec (Canada)). Feb 1983. Contract AC08-81DP40162. 110p. NTIS, PC A06/MF A01. Order Number DE83009311.

Two explanations are offered which can account for heat inhibition found in laser-fusion experiments. The first explanation requires an anisotorpic electron velocity distribution with a higher temperature parallel to the surface than into the surface. This provides axial heat inhibition. Lateral heat inhibition is associated with azimuthal magnetic fields. The second explanation requires the presence of both hot suprathermal and thermal electrons. The hot electrons can cause the flux limiter to decrease substantially below the free-streaming limit in an intermediate range of collisionality. Conditions for this situation occur in the coronal region. We compare a Maxwellian distribution to an exp(-v^5/v^5/sub c/) variation for the cold electrons and find that the flux limiter decreases more for the latter case. The effects of collisions between cold and hot electrons is also looked into. The Cartesian tensor approach is used in the above investigations with various forms for the zeroth order electron velocity distribution function.

24827 **(DOE/ET/52048—19) Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall.** Watson, R.D.; Peterson, R.R.; Wolfer, W.G. (Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering). Aug 1981. Contract AC02-78ET52048. 9p. (CONF-810831—59; UWFDM—433). NTIS, PC A02/MF A01. Order Number DE82000907.

From 2. fusion reactor materials meeting; Seattle, WA, USA (9 Aug 1981).

A lifetime methodology has been developed which couples the long-term stress history for a generic first wall element to a two-dimensional fatigue crack growth calculation, while including, in a self-consistent manner, the detrimental effects of radiation damage. The reduction in fracture toughness due to embrittlement can reduce lifetimes by as much as a factor of 10 by accelerating stage II fatigue crack growth and enhancing the potential for brittle fracture. Swelling and irradiation creep appear not to be life-limiting, and a certain amount of wall erosion is found to enhance first wall lifetimes.

24828 **(DOE/IG—0189) Tokamak Fusion Test Reactor Project.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 11 Feb 1983. 39p. TIC. Order Number DE83006929.

Report to The Secretary.

Where the project's major contracts for buildings and equipment have experienced significant increases in cost, even though the contracts were for fixed prices, IG concluded that a major reason for the increases was the failure to adequately specify requirements prior to awarding the contracts. IG recommended that the Department should develop guidelines on what constitutes an adequate specification for a fixed-price contract and what controls should be placed over change orders. The Assistant Secretary for Management and Administration indicated in his comments to the draft report that an upcoming revision of the Accounting Practices and Procedures Handbook would establish controls over reallocations of construction funds to operating funds. Recommendations also propose that particular attention be given to ensuring that an agreed-upon plan and budget for completing the project is established, that a performance measurement system be implemented by the Princeton Plasma Physics Laboratory, and that improvements be made in the laboratory's Cost/Schedule Performance Report. Improvements are also needed in the quality assurance and safety programs of the Princeton Plasma Physics Laboratory. A number of recommendations from previous quality-assurance and safety reviews, performed by personnel from the Princeton Plasma Physics Laboratory and the Department of Energy, have not been implemented. Comments to the draft report also address these outstanding issues. (PSB)

24829 **(GA-A—16845) Computer control and data acquisition for neutral-beam injectors.** Glad, A.S. (GA Technologies, Inc., San Diego, CA (USA)). Sep 1982. Contract AT03-76ET51011. 9p. (CONF-820948—7). NTIS, PC A02/MF A01. Order Number DE83008457.

From 12. symposium on fusion technology; Juelich, F.R. Germany (13 Sep 1982).

Computer support of General Atomic's Doublet III neutral beam injectors provides: (1) the capability of acquiring, processing and displaying all beam physics data; (2) the real time periodic monitoring and control of all neutral beam subsystems; (3) the sequencing of multiple ion sources asynchronously from the same computer system. (4) the permanent archiving of all beam physics and diagnostic data.

24830 **(HEDL-SA—2700) Role of radiation-damage analysis in the fusion program.** Doran, D.G. (Hanford Engineering Development Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76FF02170. 11p. (CONF-821049—17). NTIS, PC A02/MF A01. Order Number DE83008402.

From TMS/AIME fall meeting(Radiation damage analysis for fusion reactors); St. Louis, MO, USA (24 Oct 1982).

The objective of radiation-damage analysis is the prediction of the performance of facility components exposed to a radiation environment. The US Magnetic Fusion Energy materials program includes an explicit damage-analysis activity within the Damage Analysis and Fundamental Studies (DAFS) Program. Many of the papers in this volume report work done directly or indirectly in support of the DAFS program. The emphasis is on developing procedures, based on an understanding of damage mechanisms, for applying data obtained in diverse radiation environments to the prediction of component behavior in fusion devices. It is assumed that the Fusion Materials Irradiation Test Facility will be available in the late 1980's to test (and calibrate where necessary) correlation procedures to the high fluences expected in commercial reactors.

24831 **(HEDL-TME—82-28) Preliminary assessment of interactions between the FMIT deuteron beam and liquid-lithium target.** Hassberger, J.A. (Hanford Engineering Development Lab., Richland, WA (USA)). Mar 1983. Contract AC06-76FF02170. 54p. NTIS, PC A04/MF A01. Order Number DE83009719.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Scoping calculations were performed to assess the limit of response of the FMIT lithium target to the deuteron-beam interactions. Results indicate that most response modes have acceptably minor impacts on the lithium-target behavior. Individual modes of response were studied separately to assess sensitivity of the target to various phenomena and to identify those needing detailed evaluation. A few responses are of sufficient magnitude to warrant further investigation. Potential for several different responses combining additively is identified as the major area requiring further consideration.

24832 **(IPPJ—529) Tokamak-stellarator hybrid configurations with unlinked helical coils.** Ikuta, K. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Jul 1981. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700729.

The equilibrium configuration of toroidal, current-carrying plasma is investigated, where the plasma is confined in a vacuum stellarator configuration generated by unlinked helical coils. In the limit of current-free configurations the equilibrium of plasma can be obtained since the vacuum field forms a family of closed, nested magnetic surfaces.

24833 (JAERI-M—9390, pp 8-30) **Overview of United States tritium programs.** Baublitz, J.E. (Department of Energy, Washington, DC (USA)). Mar 1981. B. Order Number DE83780427.

From US/Japan workshop on fusion fuel handling; Tokyo, Japan (13 Oct 1980).

Overview of tritium programs in technology development and in environmental and health areas is given in this report. The first part of the report explains the organization of tritium research in the United States. Four Assistant Secretaries (the Director of Energy Research, the Assistant Secretary for Environment, the Assistant Secretary for Nuclear Energy, and the Assistant Secretary for Defense Programs) of the Department of Energy share the responsibility for the development of fusion technology. Under the Department of Energy, there are a number of laboratories and universities participating in the technology development of tritium related systems for nuclear fusion. The second part of this report illustrates the activities done at these laboratories. At Los Alamos, the Tritium System Test Assembly (TSTA) is under construction. At Lawrence Livermore, the studies of basic hydrogen isotope properties have been made, and organic getters have been developed. The Rotating Target Neutron Source is operating at LL. At Argonne National Laboratory, the Lithium Processing Test Loop has been operated. The Princeton Plasma Physics Laboratory is constructing the Tokamak Fusion Test Reactor (TFTR). At Oak Ridge National Laboratory, works are going on in tritium permeation research. At Sandia Livermore, a lot of works have been done on material interactions, and the tritium system design support for the Zephyr ignition project is provided. The Mound Facility is constructing several tritium systems for TFTR. The University of Wisconsin has been working on solid breeder concepts and conceptual tritium system design. Details of these works are explained.

24834 (JAERI-M—9390, pp 31-43) **Research program and present status of tritium technology in Japan Atomic Energy Research Institute.** Obata, Yukio (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment). Mar 1981. B. Order Number DE83780427.

From US/Japan workshop on fusion fuel handling; Tokyo, Japan (13 Oct 1980).

The theoretical and experimental studies on plasma physics are conducted at Japan Atomic Energy Research Institute (JAERI). The main device is the medium size tokamak JFT-2. The plasma heating technology using both neutral beam injectors and radiofrequency heating is developed. Plasma-wall interaction is intensively studied. The design studies of the fusion machines which follow JT-60 is in progress. The development of superconducting magnets is also in progress. The development of blanket and reactor materials has been studied. The development of tritium technology is explained in this report. Regarding the study of the fusion fuel circulation and purification system, the process technology is to be predominantly investigated. The process technology includes purification, hydrogen isotope separation, storage, analysis, measurement, etc. In relation to the INTOR workshop, the system analysis of hydrogen isotope separation in the fuel circulation system has been carried out. Studies are made concerning the preparation of lithium oxide for blankets, and the determination of its physical and chemical properties. The encouraging results of tritium recovery have been obtained. The studies concerning the safe handling of tritium are in progress.

24835 (JAERI-M—9390, pp 148-162) **Development of tritium technology for the United States Magnetic Fusion Energy Program and an update on the Tritium Systems Test Assembly.** Anderson, J.L. (Department of Energy, Washington, DC (USA)). Mar 1981. B. Order Number DE83780427.

From US/Japan workshop on fusion fuel handling; Tokyo, Japan (13 Oct 1980).

The tritium technology development for the DOE fusion program takes place principally at three laboratories. The major aspects of the program are explained. Mound Facility has been involved in the Tritium Effluent Control Laboratory (TECL) project and the Tritium Storage and Delivery System (TSDS) project for TFTR. The goal of TECL is to prevent any tritium release to environment, and to recover for reuse all tritium released within the laboratory. The TSDS is designed to achieve the highest possible levels of reliability, safety, and tritium containment. The TSDS will be tested with the load of 10^4 Curies of tritium to ensure the reliable operation of the entire system. The program on fusion reactor researches at the Argonne National Laboratory includes a number of applied research subjects. The principal focus of this work is on the studies of fuel handling, breeder blanket processing and tritium containment. Modest advances have been made in recent years in the study of liquid lithium processing. The recovery of tritium following the environmental or atmospheric release of tritium is one

of main concerns at Lawrence Livermore National Laboratory. The Rotating Target Neutron Source (RTNS-2) at LLNL is an accelerator-based neutron source. The tritium permeability of structural materials and the surface effects on the permeation rate were measured at Oak Ridge National Laboratory. The activities at other facilities in U.S.A. are also introduced in this paper.

24836 **(ORNL/Sub—79/21453/13) 60-GHz-gyrotron development program. Quarterly report No. 13, July-September 1982.** Shively, J.F.; Caplan, M.; Choi, E.K. (Varian Associates, Palo Alto, CA (USA). Palo Alto Microwave Tube Div.). 1982. Contract W-7405-ENG-26. 114p. NTIS, PC A06/MF A01. Order Number DE83008554.

The objective of this program is to develop a microwave oscillator capable of producing 200 kW of CW power at 60 GHz. A CW experimental tube, X-5, which incorporated a thinner double disc output window to improve window bandwidth, and some modifications to the drift tunnel and cavity coupling proven to be successful in earlier pulse tube tests produced 123 kW of CW output power at 60 GHz before rf load coolant boiling and tube window failure terminated tests. A water load of new design has been constructed and will be used in conjunction with a 56 GHz gyrotron next quarter. Alternative window designs are being explored and developed.

24837 **(Rijnhuizen—82-142) Summary of processes relevant for the particle balance of a cold plasma blanket contaminated with a small amount of helium.** Potters, J.H.H.M.; Goedheer, W.J. (Stichting voor Fundamenteel Onderzoek der Materie, Jutphaas (Netherlands). Inst. voor Plasma-Fysica). Apr 1982. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700731.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted figs., 24 refs.

A summary is given of the atomic processes which are relevant for the ionization balance and for the transport in a plasma consisting of hydrogen with a small admixture of helium. Attention is paid mainly to processes in plasmas with temperatures below 100 eV and electron densities between $3x10^{13}$ and $3x10^{14}cm^{-3}$ conditions which prevail in a so-called cold plasma blanket. The species considered are electrons, protons, hydrogen atoms (ground state and excited), α-particles, He^{+}-ions (ground state and excited), and helium atoms (ground state and excited). The discussed processes are charge exchange, ionization, recombination, (de-) excitation, and elastic scattering.

24838 **(UCID—19638) Fission-suppressed hybrid reactor: the fusion breeder.** Moir, R.W.; Lee, J.D.; Coops, M.S. (Lawrence Livermore National Lab., CA (USA)). Dec 1982. Contract W-7405-ENG-48. 564p. NTIS, PC A24/MF A01. Order Number DE83008737.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Results of a conceptual design study of a ^{233}U-producing fusion breeder are presented. The majority of the study was devoted to conceptual design and evaluation of a fission-suppressed blanket and to fuel cycle issues such as fuel reprocessing, fuel handling, and fuel management. Studies in the areas of fusion engineering, reactor safety, and economics were also performed.

24839 **(UCID—19748) Analysis of ambient vibrational motion of MFTF-A vessel/magnet structure.** Weaver, H.J.; Fields, D.E.; Mellor, J.E. (Lawrence Livermore National Lab., CA (USA)). 25 Jan 1983. Contract W-7405-ENG-48. 143p. NTIS, PC A07/MF A01. Order Number DE83009113.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Ambient-acceleration time-history motions were measured on the MFTF-A vessel. These time histories were converted to displacement time-history signals which are to be used as an aid in the design of laser and microwave interferometers. This report describs the test procedures, data-processing techniques, and results of this testing.

24840 **(UCRL—15521-Vol.1) Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets.** Nietert, R.E. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 365p. NTIS, PC A16/MF A01. Order Number DE83009324.

Portions are illegible in microfiche products; Thesis. Submitted to Univ. of Wisconsin, Madison.

The following five appendices are included: (1) physical properties of materials, (2) thermal entrance length Nusselt number variations, (3) stationary particle bed temperature variations, (4) falling bed experimental data and calculations, and (5) stationary bed experimental data and calculations. (MOW)

24841 **(UCRL—15521-Vol.2) Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets.** Nietert, R.E. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 283p. NTIS, PC A13/MF A01. Order Number DE83009322.

Thesis. Submitted to Univ. of Wisconsin, Madison.

The heat-transfer characteristics of flowing and stationary packed-particle beds have recently become of interest in connection with conceptual designs of fusion reactor blankets. A detailed literature survey has shown that the processes taking place in such beds are not fully understood despite their widespread use in the chemical industry and other engineering disciplines for more than five decades. In this study, two experimental investigations were pursued. In the first, a heat-transfer loop was constructed through which glass microspheres were allowed to flow by rgravity at controlled rates through an electrically heated stainless steel tubular test section. In the second, an annular packed bed was constructed in which heat was applied through the outer wall by electric heating of a stainless steel tube. Cooling occurred at the inner wall of the annular bed by flowing air through the central tube. A second air stream was allowed to flow through the voids of the packed bed. An error-minimization technique was utilized in order to obtain the two-dimensional one-parameter effective conductivity for the bed by comparing the experimental and theoretically predicted temperature profiles. Experiments were conducted for various modified Reynolds numbers less than ten.

24842 **(UCRL—52000-83-1) Energy and technology review.** (Lawrence Livermore National Lab., CA (USA)). Jan 1983. Contract W-7405-ENG-48. 39p. NTIS, PC A03/MF A01. Order Number DE83009213.

Portions are illegible in microfiche products.

Separate abstracts were prepared for each of the three included sectons. (MOW)

24843 (UCRL—52000-83-1, pp 13-22) **Laser fusion x-ray measurements.** Jan 1983. NTIS, PC A03/MF A01. Order Number DE83009213.

Portions are illegible in microfiche products.

In Energy and technology review.

A number of new instruments, with greatly improved energy and time resolution and a broader energy range, were developed for measuring x-ray spectra from laser fusion experiments.

24844 **(UCRL—53344-Vol.4) Physics of laser fusion. Volume IV. The future development of high-power solid-state laser systems.** Emmett, J.L.; Krupke, W.F.; Trenholme, J.B. (Lawrence Livermore National Lab., CA (USA)). Nov 1982. Contract W-7405-ENG-48. 76p. NTIS, PC A05/MF A01. Order Number DE83009211.

Solid state lasers, particularly neodymium glass systems, have undergone intensive development during the last decade. In this paper, we review solid state laser technology in the context of high-peak-power systems for inertial confinement fusion. Specifically addressed are five major factors: efficiency, wavelength flexibility, average power, system complexity, and cost; these factors today limit broader application of the technology. We conclude that each of these factors can be greatly improved within current fundamental physical limits. We further conclude that the systematic development of new solid state laser madia, both vitreous and crystalline, should ultimately permit the development of wavelength-flexible, very high average power systems with overall efficiencies in the range of 10 to 20%.

24845 (UCRL—85986) TMX upgrade magnet system mechanical issues. Pedrotti, L.R.; Myall, J.O.; Hibbs, S.M.; Wong, R.L.; Ng, D.S.; Hooper, E.B.; Priest, R.E.; Calderon, M.O.; Chargin, A.K. (Lawrence Livermore National Lab., CA (USA)). 26 Oct 1981. Contract W-7405-ENG-48. 4p. (CONF-811040—176). NTIS, PC A02. Order Number DE82012751.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Paper copy only, copy does not permit microfiche production.

This paper presents the mechanical design of the TMX Upgrade and discusses its engineering requirements. Specifically, the design and construction features of the water-cooled copper coils-as well as the restraints, supports, and leads-are presented. The cooling and structural requirements are discussed and analyzed, and a new method of aligning the coils on magnetic axis is given.

24846 (UCRL—88222) Environment and safety: major goals for MARS. Maninger, R.C. (Lawrence Livermore National Lab., CA (USA)). 16 Mar 1983. Contract W-7405-ENG-48. 8p. (CONF-830406—4). NTIS, PC A02/MF A01. Order Number DE83009117.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

The Mirror Advanced Reactor Study (MARS) is a conceptual design study for a commercial fusion power reactor. One of the major goals of MARS is to develop design guidance so that fusion reactors can meet reasonable expectations for environmental health and safety. One of the first steps in the assessment of health and safety requirements was to examine what the guidelines might be for health and safety in disposal of radioactive wastes from fusion reactors. Then, using these quidelines as criteria, the impact of materials selection upon generation of radioactive wastes through neutron activation of structural materials was investigated. A conclusion of this work is that fusion power systems may need substantial engineering effort in new materials development and selection to meet the probable publicly acceptable levels of radioactivity for waste disposal in the future.

24847 Fusion reactivities for several beam and target ion distributions. Slaughter, D. (University of California, Lawrence Livermore National Laboratory, Livermore, California 94550). *Journal of Applied Physics;* **54**: No. 3, 1209-1217(Mar 1983). Contract W-7405-ENG-48.

Fusion reactivities $\langle\sigma v\rangle$ in the mean ion energy range 0.1—200 keV have been calculated for the reactions: D(d,n), T(d,n), D(d, p), ^{3}He(d, p) and T(t,2n); and for several different ion energy and angular distributions considered plausible in hot, magnetically confined plasmas. Calculations were carried out to a numerical accuracy of about 5% and the resulting variation of reactivity with mean ion energy is found to be well represented by a simple polynomial function. The polynomial functions are plotted as a function of mean ion energy and their coefficients given. Results of the calculations show that fusion reactivity is very sensitive to the functional form of the speed distribution at mean energies below a few keV, but reactivity is roughly independent of the form of the speed distribution (within a factor of 2) above 10 keV for most of the reactions investigated. Similarly, the importance of the ion angular distribution is large at energies below a few keV but small at high ion energies.

24848 Magnetohydrodynamic stability of magnetic slabs. Banos, A. Jr.; Adler, E.A.; Fried, B.D.; Jechart, I. (Department of Physics, University of California, Los Angeles, California 90024). *Physics of Fluids;* **26**: No. 3, 780-789(Mar 1983). Contract AM03-76SF00010.

A simplified procedure is developed for calculating the ideal magnetohydrodynamic stability of a "magnetic slab" consisting of two planar rows of staggered parallel conductors carrying oppositely directed (equal or unequal) currents, a configuration which is the planar analog of the University of California, Los Angeles, Large Mirror Ratio Experiment (LAMEX). Instead of solving the Grad—Shafranov equation to find the magnetic field corresponding to magnetohydrodynamic equilibrium, use was made of conformal mapping techniques to obtain analytical expressions for the vector potential A for the sharp boundary case, and then the plasma was allowed to "spill over" into the vacuum region with a permissible pressure profile p(A). Using conventional magnetohydrodynamic analysis, based on the well-known energy principle, the maximum stable pressure gradient on each magnetic surface was determined and, from that, the optimum permissible pressure profile p(A) as a function of the spacings (horizontal and vertical) between the conductors and the currents in the two rows was also determined. Significant reductions in maximum stable beta are found compared to the sharp boundary case.

24849 Simple ablative implosion model: shell dynamics. Mayer, F.J.; Larsen, J.T.; Steele, J.W. (KMS Fusion, Inc., P.O. Box 1567, Ann Arbor, Michigan 48106). *Physics of Fluids;* **26**: No. 3, 830-834(Mar 1983). Contract W-7405-ENG-48.

A simple model, derived from Newton's Second Law, for the ablative implosion of a thin spherical shell is presented. The scaling dependence of the implosion time, shell velocity, and mass loss on shell dimensions and the critical physical parameter, the ablation pressure, is derived. Finally, the model is used to examine implosion energy efficiency and to describe an interesting application, wall-recoil heating of a contained fuel gas.

24850 Experimental studies on pump limiters. Mioduszewski, P. (Oak Ridge National Lab., TN (USA). Fusion Energy Div.). *Journal of Nuclear Materials;* **111**: 253-267(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Pump limiters are mechanical devices for He-ash removal, fuel particle control, and possibly impurity control. Different designs have been suggested by various authors over the past decade. However, the magnetic divertor concepts seemed to be more promising, mainly because of their remote plasma-material interactions. All of the characteristics of magnetic divertors have been proven experimentally, but the overall performance and complexity cause concern about their application to tokamak reactors. Consequently, it is now time to explore the potential of mechanical particle control devices, i.e. pump limiters. Because of the high recycling at the limiter, it is sufficient to exhaust only a small fraction, about 1-10%, of the limiter particle flux to remove e.g. He at its rate of production. Pump limiter experiments have been conducted so far on Alcator, PDX, Macrotor, and ISX. Depending on the experimental design, a pressure build-up of between 1 mTorr and 50 mTorr has been reported. The closed configuration pump limiters provide high collection efficiencies, but have to accomodate high power fluxes at the leading edge. An open configuration, on the other hand, avoids leading edges but provides only fairly low collection efficiencies. The pump limiter development program now calls for a full pump limiter to be implemented in a major tokamak device. Presently, full-size pump limiter experiments on PDX, ISX, and TEXTOR are in preparation.

24851 Formation of magnetic islands and ergodic magnetic layers in wall-lapping plasma as a non-divertor concept for a reactor-relevant tokamak. Kawamura, T.; Abe, Y.; Tazima, T. (Nagoya Univ. (Japan). Inst. of Plasma Physics). *Journal of Nuclear Materials;* **111**: 268-273(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The formation of resonant islands and the ergodization of magnetic field lines in the tokamak boundary due to the subsidiary helical coils are numerically analyzed for the wall-lapping plasma concept as a non-divertor scenario for a reactor-relevant tokamak. The parameters are taken referring to the R-tokamak, a reacting plasma project in IPP-Nagoya. We have verified that this concept could be realized using the rotating islands produced by three sets of helical coils carrying alternating currents with shifted phases. It is also shown that this is possible by using local helical coils which span limited toroidal regions of the torus.

24852 **Large area pumped limiter experiments in MACROTOR.** Talmadge, S.; Conn, R.W.; Prinja, A.K.; Taylor, R.J. (California Univ., Los Angeles (USA). Center for Plasma Physics and Fusion Engineering). *Journal of Nuclear Materials;* **111**: 274-278(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

A large area pumped limiter, similar in principle to designs proposed for prototype reactors, was tested on MACROTOR. Scaling of neutral pressure with plasma density reveals a two-regime feature: a linear regime of low plasma density and a non-linear regime at high plasma density. In the high density regime. Proportional nsup(m) where $2.5 < m < 3.5$. The non-linear interactions come into play when the charge exchange mean free path equals the effective scale length of the channel structure. Energy flux propagating down the pump duct was measured as a function of axial position. The energy flux e-folding length is approximately one diameter near the mouth of the duct. The decay is much slower as the axial position into the duct is increased.

24853 **Physics of particle exhaust in pump limiters.** Prinja, A.K.; Conn, R.W.; Talmadge, S. (California Univ., Los Angeles (USA). Center for Plasma Physics and Fusion Engineering); Heifetz, D.; Post, D. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 279-286(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Monte Carlo calculations are presented of neutral particle flows in hollow collection probes and large area limiters used in recent experiments. The collected neutral hydrogen flux scales linearly with plasma density for nsub(i) $< 2 \times 10^{11}$ cm^{-3} where the plasma is essentially transparent to the neutrals. For $2 \times 10^{11} <$ nsub(i) $< 2 \times 10^{13}$ cm^{-3} the neutral flux varies mildly nonlinearly as nsub(i)sup(1.26). The transition between regimes is driven by the mean free path for molecular hydrogen dissociation being of the order of the probe dimensions. Calculations of the neutral energy spectra emerging from the pump ducts of various lengths indicates that within the accuracy of available low energy surface data, energy transfer to the duct walls is very inefficient. Furthermore, the results indicate that 'energy freezing' occurs at epithermal energies as a consequence of particle and energy reflection coefficients approaching unity at low energies.

24854 **Infrared thermography of a pump limiter on MACROTOR.** Pontau, A.E.; Gauster, W.B. (Sandia National Labs., Livermore, CA (USA)); Mullendore, A.W. (Sandia National Labs., Albuquerque, NM (USA)); Conn, R.W.; Grotz, S.P.; Talmadge, S.; Taylor, R.J. (California Univ., Los Angeles (USA)). *Journal of Nuclear Materials;* **111**: 287-293(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Infrared thermography in the 2-5 μm wavelength range has been used to observe the surface heating of a pump limiter module in the Macrotor tokamak. Modest temperature rises are attributed to energy deposition by particle fluxes during discharges. Comparison of measured and calculated values indicated that heat loads were determined by module geometry, plasma position, and plasma scrape-off distance. In addition to the gradual, long-term heating of the entire module, rapid (on a time scale $< 10^{-3}$ s) surface heating and cooling, associated with disruptions, were observed. The time scales were consistent with energy deposition for short times and subsequent thermal conduction to the remainder of the module. As much as 10% of the total plasma energy was deposited on the module during these discharges, with up to approximately one-quarter of the energy deposition occurring during several 100 μs disruptions. Infrared thermography was found to be a valuable real-time diagnostic tool for studying the interaction of the plasma with an in-vessel component.

24855 **Computational study of operating regimes for poloidal divertors.** Petravic, M.; Heifetz, D.; Post, D. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 294-297(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

We have identified three theoretical operating regimes for poloidal divertors. These regimes are determined by the geometry of the divertor and the input energy and particle fluxes, and are characterized by the divertor plasma density and temperature. A fully self-consistent two-dimensional model for the plasma and neutral atom and molecule transport was used to study poloidal divertor operation. Extensions of our previous calculations important to this study were the inclusion of parallel electron and ion thermal conduction. We find that the key physics in divertor operation is the neutral recycling near the neutralizer plate. This can be parametrized by R = GAMMAsub(P)/GAMMAsub(O), the ratio of particle flux striking the neutralizer plate to the particle flux entering the divertor. Values of R approx. equal to 1 can be produced by large pumping rates near the neutralizer plates resulting in low neutral recycling and a high temperature, low density divertor plasma. By decreasing the pumping near the neutralizer plate, R can be raised to an intermediate value of 5-10, the plasma temperature lowered by the same factor, and the density raised by a factor of 10-30. In this regime, escape of the neutrals back to the main plasma is virtually blocked. By further restricting the pumping, R can be raised to twenty or more, thereby lowering the temperature by a factor of twenty or more and raising the density by a factor of ninety or more. Such high density regimes have been observed on D-III and appear to offer the most promise for impurity control and particle control on large reactor experiments such as INTOR or FED. In this paper, we explore the range $3 < R < 16$.

24856 **Pumping and erosion rates for the TFTR and INTOR/FED limiter designs.** Heifetz, D.; Post, D.; Ulrickson, M.; Schmidt, J. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 298-304(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Wall power deposition and erosion rates due to charge-exchanging neutrals, along with pumping rates, are computed for various TFTR and INTOR/FED limiter and divertor schemes. It was found that only approx. equal to 7% of charge exchange power was deposited on the first wall in a proposed INTOR/FED 'T' limiter. Thus, the first wall will not have to be replaced as often as the limiter.

24857 **Reduction of recycling by pumping at the PDX limiter.** Cecchi, J.L.; Knize, R.J.; Dylla, H.F.; Fonck, R.J.; Owens, D.K. (Princeton Univ., NJ (USA). Plasma Physics Lab.); Sredniawski, J.J. (Grumman Aerospace Corp., Bethpage, NY (USA)). *Journal of Nuclear Materials;* **111**: 305-310(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

We have installed two arrays of Zr-Al getters adjacent to the PDX limiter to effect the pumping of neutrals formed in this region. The projected area of the getters is approximately 0.4% of the plasma area, and the measured H_2 pumping speed is 16000 l/s. During ohmic discharges, the getters reduced the electron density decay time from 340 to 180 ms. This result, combined with Hsub(α), data indicates that the recycling coefficient decreases by 10% or more.

24858 **Neutral gas blanket effects in a gaseous divertor.** Hsu, W.L.; Yamada, M.; Tenney, F.H. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 311-316(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The gaseous divertor employs a neutral gas blanket to absorb the plasma heat flux in the divertor chamber. This novel method for resolving the heat loading problem in a conventional divertor system is simulated experimentally. In our operational range (nsub(e) <= 5 x 10^{13} cm^{-3}, Tsub(e) <= 5 eV) it is demonstrated that the localized plasma heat flux is scattered relatively uniformly with neutral pressures of a few microns. At large neutral pressures the plasma stream is neutralized without touching a material wall. Plasma pumping inhibits neutral backflow and can sustain a neutral pressure difference comparable to the plasma pressure. Effective divertor channel conductance is measured to be reduced by a factor of six.

24859 **Test of a toroidal large area limiter in the ASDEX tokamak.** Vernickel, H.; Berhringer, K.; Campbell, D.; Eberhagen, A.; Engelhardt, W.; Fussmann, G.; Gehre, O.; Gernhardt, J.; Glock, E.; Gierke, G.V. (Association Euratom-Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 317-322(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

A toroidal large area limiter was installed in the divertor tokamak ASDEX. The limiter basically consists of a plane annular stainless steel sheet which is tangential to the plasma and which is placed in the bottom of the main plasma chamber. In a second series of experiments this limiter was covered with graphite plates. With the steel limiter clean discharges could not be obtained. Energy deposition on the limiter was only 12% of the input. With the graphite limiter Zsub(eff) was below 3, energy deposition on the limiter was 25% (up to 40% in low density operation). Energy deposition was toroidally symmetrical. Results, including some experiments with a single null divertor are presented.

24860 **All TiC coated limiter experiment in the JIPP T-II tokamak.** Gomay, Y. (Toshiba Corp., Kawasaki, Kanagawa (Japan). Research and Development Center); Kawahata, K.; Noda, N.; Tanahashi, S. (Nagoya Univ. (Japan). Inst. of Plasma Physics). *Journal of Nuclear Materials;* **111**: 323-327(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

All the aperture limiters in JIPP T-II were changed to TiC coated graphite. The maximum density in this condition is 7.6 x 10^{13} cm^{-3} with the safety factor of 4.5, which is 2.7 times as high as the value obtained by the Murakami scaling. The Zsub(eff) values with this density and with a medium density of 2.4 x 10^{13} cm^{-3} are both close to unity after discharge cleaning for only 3 days. The behavior of limiter material release was found to be steady within a factor of two during the discharge, suggesting that the release mechanism is ion sputtering. Residual gas analysis also suggested that this sputtering is not chemical, which may be partly because the limiter surface temperature during the discharge is below 150°C.

24861 **RF divertor principle study in the TFR plasmas.** *Journal of Nuclear Materials;* **111**: 328-331(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

When resonant conditions are met (coincidence between the harmonic of the cyclotron frequency and the two-ion hybrid layers), an effective cleaning of the discharge is observed. Since diverted particles are expelled out from the discharge with any high energy, they can be trapped into the wall or the limiter and no longer contribute to the plasma contamination through recycling. However, although the sputtering yield of energetic argon ions on nickel is very high, no noticeable increase of the nickel content was observed for the resonant conditions.

24862 **Impurity control in the Varennes tokamak.** Boucher, C.; Geoffrion, J.; Gregory, B.C.; Johnston, T.W.; Stansfield, B.L.; Terreault, B.; Vitali, J.C.A. (Quebec Univ., Varennes (Canada). Energy Research Centre); Couture, P.; Fuchs, V.; Shoucri, M.M. (Institut de Recherche de l'Hydro-Quebec, Varennes (Canada)). *Journal of Nuclear Materials;* **111**: 332-334(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24863 **Divertor efficiency in ASDEX.** Engelhardt, W.; Becker, G.; Behringer, K.; Campbell, D.; Eberhagen, A.; Fussmann, G.; Gehre, O.; Gierke, G.V.; Glock, E.; Haas, G. (Association Euratom-Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 337-342(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The divertor efficiency in ASDEX is discussed for ohmically heated plasmas. The parameters of the boundary layer both in the torus midplane and the divertor chamber have been measured. The results are reasonably well understood in terms of parallel and perpendicular transport. A high pressure of neutral hydrogen builds up in the divertor chamber and Franck-Condon particles recycle back through the divertor throat. Due to dissociation processes the boundary plasma is effectively cooled before it reaches the neutralizer plates. The shielding property of the boundary layer against impurity influx is comparable to that of a limiter plasma. The transport of iron is numerically simulated for an iron influx produced by sputtering of charge exchange neutrals at the wall. The results are consistent with the measured iron concentration. First results from a comparison of the poloidal divertor with toroidally closed limiters (stainless steel, carbon) are given. Diverted discharges are considerably cleaner and easier to create.

24864 **Impurity levels and power loading in the PDX tokamak with high power neutral beam injection.** Fonck, R.J.; Bell, M.; Bol, K.; Brau, K.; Budny, R.; Cecchi, J.L.; Cohen, S.; Davis, S.; Dylla, H.F.; Goldston, R. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 343-354(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The PDX tokamak provides an experimental facility for the direct comparison of various impurity control techniques under reactor-like conditions. Four neutral beam lines inject > 6 MW for 300 ms. Carbon rail limiter discharges have been used to test the effectiveness of perpendicular injection, but non-disruptive full power operation for > 100 ms is difficult without extensive conditioning. Initial tests of a toroidal bumper limiter indicate reduced power loading and roughly similar impurity levels compared to the carbon rail limiter discharges. Poloidal divertor discharges with up to 5 MW of injected power are cleaner than similar circular discharges, and the power is deposited in a remote divertor chamber. High density divertor operation indicates a reduction of impurity flow velocity in the divertor and enhanced recycling in the divertor region during neutral injection.

24865 **Review of the recent expanded boundary divertor experiments in the Doublet III device.** Mahdavi, M.A.; Armentrout, C.J.; Blau, F.P.; Bramson, G.; Brooks, N.H.; Brown, B.B.; Burrell, K.H.; Callis, R.; Chase, R.P.; Deboo, J.C. (General Atomic Co., San Diego, CA (USA)). *Journal of Nuclear Materials;* **111**: 355-361(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Analysis of the expanded boundary divertor in Doublet III reveals a medium density operating regime (anti nsub(e) approx. <= 4 x 10^{13} cm^{-3}), in which (1) the divertor density nsub(e) (Div) rises with the cube of the main plasma line average density, anti nsub(e), and (2) the neutral pressure at the exhaust end of the diver-

tor has a quadratic dependence on anti nsub(e) (with divertor plasma temperatures approx. <= 15 eV). In this regime, injection of argon into the discharge results in a steady state concentration of argon, which is two orders of magnitude higher in the divertor plasma than in the main discharge. This trapping effect suggests that the argon concentration in the divertor region may be useful as an externally controllable parameter; that is, injected argon effectively cools the plasma boundary, yet is not deleterious to the plasma as a whole. A model which successfully describes the behavior of the edge and divertor plasmas in ohmically heated discharges suggests that these desirable trapping and radiative features may be maintained in the high powered neutral beam heating phase.

24866 **High density, single-null poloidal divertor results in doublet III.** Shimada, M.; Nagami, M.; Ioki, K.; Izumi, S.; Maeno, M.; Matsuda, T.; Nishikawa, M.; Ohtsuka, M.; Shinya, K.; Yokomizo, H. (General Atomic Co., San Diego, CA (USA)). *Journal of Nuclear Materials;* 111: 362-369(Nov-Dec 1982). Contract AT03-80SF11512.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Experimental results of divertor characteristics on impurity suppression, helium ash exhaust and remote radiative cooling are reviewed. In a throatless (open) divertor such as the single-null poloidal divertor in Doublet III, a dense and thick scrape-off layer provides strong particle shielding in high density divertor discharges, which results in a high neutral pressure and radiative cooling of the divertor even in an impurity-free condition. The feasibility of employing an open divertor in a reactor-grade device like INTOR is discussed. A preliminary result of divertor experiments with a 1.6 MW neutral-beam injection is presented.

24867 **Divertors and impurity control: where we stand, where we have to go.** Keilhacker, M.; Lackner, K. (Association Euratom-Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* 111: 370-380(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

In the present paper we first recapitulate the maximum impurity concentrations compatible with the condition for ignition and with the restrictions on fuel dilution and state the requirements on particle exhaust and heat removal for an Intor size ignition experiment. We then discuss the potential of the divertor to meet these requirements by summarizing the results of present-day divertor experiments and the current theoretical understanding of divertor operation. In the last section we finally show how some divertor characteristics scale with heating power, and suggest experiments that have to be carried out before divertors can possibly be used in fusion reactors.

24868 **Models for poloidal divertors.** Post, D.E.; Heifetz, D.; Petravic, M. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* 111: 383-395(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Recent progress in models for poloidal divertors has both helped to explain current divertor experiments and contributed significantly to design efforts for future large tokamak (INTOR, etc.) divertor systems. These models range in sophistication from zero-dimensional treatments and dimensional analysis to two-dimensional models for plasma and neutral particle transport which include a wide variety of atomic and molecular processes as well as detailed treatments of the plasma-wall interaction. This paper presents a brief review of some of these models, describing the physics and approximations involved in each model. We discuss the wide variety of physics necessary for a comprehensive description of poloidal divertors. To illustrate the progress in models for poloidal divertors, we discuss some of our recent work as typical examples of the kinds of calculations being done.

24869 **Global estimates of impurity levels and wall erosion in INTOR.** McCracken, G.M.; Fielding, S.J.; Ohtsuka, H. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.). *Journal of Nuclear Materials;* 111: 396-402(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

A global model is described which calculates the impurity levels resulting from plasma and impurity sputtering. The edge temperature is determined in a self consistent way from the input power and the particle containment time. Calculations are presented for the specific case of INTOR considering both carbon and iron walls. The impurity level is very dependent on the global particle containment time. For iron walls the impurity level is probably tolerable but a large fraction of the α heating power is radiated. For carbon walls the radiation level is much lower.

24870 **Theoretical model for hot plasma flowing to a wall with recycling.** Bailey, A.W.; Emmert, G.A. (Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering). *Journal of Nuclear Materials;* 111: 403-407(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Plasma flow along field lines to material walls is a common property of divertors and limiters where the plasma is neutralized at a target plate. A theoretical model to describe the hot plasma flowing to the wall, where it is neutralized, and the cold plasma produced by ionization of thermal neutrals has been developed. A necessary ingredient in this model is the electrostatic potential, which turns out to be positive near the wall (relative to further in the plasma) before dropping the sheath. The treatment is kinetic rather than fluid-like and largely analytic. The results agree well with a numerical kinetic calculation by Morse and co-workers for a uniform field case. The model is being extended to allow non-uniform magnetic fields, as is appropriate for bundle divertors.

24871 **Plasma motion and purification in an ergodic divertor.** Samain, A.; Grosman, A.; Feneberg, W. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Groupe de Recherches sur la Fusion Controlee). *Journal of Nuclear Materials;* 111: 408-412(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The main problems associated with an ergodic divertor are considered. The pressure gradient in the ergodic layer induces a plasma flow along the flux lines, which allows in principle, control of the energy of the particles reaching the wall. Also the parallel plasma flow tends to drag away the impurity ions and to decontaminate the confined plasma. These effects are considered in the framework of the quasilinear theory. A discussion shows that the real flow pattern consists of quasilinear regions where the flow is limited by transverse and diffusion effects coexisting with regions of free streaming at the sound velocity.

24872 **Dependence of hydrogen recycling on molecular effects in tokamaks.** Howe, H.C. Jr. (Oak Ridge National Lab., TN (USA)). *Journal of Nuclear Materials;* 111: 424-427(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

In this paper, we discuss several effects which result from introducing hydrogen at the edge of the main plasma as molecules rather than atoms. Molecular ionization and dissociation create a volume source of energetic atoms and ions within several centimeters of the plasma edge. The ions flow to the limiter and ultimately recycle into the plasma. The atoms are created with an isotropic velocity distribution and, therefore, half of the atom flux is directed toward the wall. The plasma fueling profile is calculated using a multigeneration neutral transport model including wall reflection.

24873 **Transport code calculations on the particle and energy unloading through overlapping magnetic islands.** Nicolai, A.; Reiter, D. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Plasmaphysik). *Journal of Nuclear Materials;* 111: 428-433(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Superposition of magnetic islands generated by currents in auxiliary windings leads in the plasma boundary to a magnetically 'mixed' layer with destroyed magnetic flux surfaces. The magnetic field structure is globally described by an only radially dependent mean inclination angle of the field lines against the toroidal direction. The model is applied to the parameters of TEXTOR with 4.5 MW additional heating. The maximum mean inclination angle is 2 x 10^{-3}. The temperatures at the separatrix and at the limiter edge are 450 eV and 54 eV. Without 'mixing' the analogous values are 1040 eV and 112 eV, respectively.

24874 **Monte Carlo simulation of the neutral gas density and temperature distribution due to the recycling processes at a poloidal, toroidal or mushroom limiter and at the divertor plate of a poloidal divertor.** Reiter, D.; Nicolai, A. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Plasmaphysik). *Journal of Nuclear Materials;* 111: 434-439(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The divertor models used so far, are either zero-dimensional, therefore accounting only roughly for the neutral gas, or two-dimensional, as for the open INTOR divertor. This model includes gas dynamic flow parallel to the magnetic field, and particle, energy, and momentum transport perpendicular to the magnetic field. Further fluid models are being developed e.g. at the IPP Garching. Since our code has sufficient geometrical flexibility, and because the statistical method is especially adequate for regions with low collision frequency, it is intended to couple the code to one of this divertor plasma models later.

24875 **Recycling of metal impurities in the limiter shadow region of a tokamak.** Claassen, H.A.; Repp, H. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Plasmaphysik). *Journal of Nuclear Materials;* 111: 440-443(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24876 **Wall material characteristics in reacting plasma modelling.** Kawamura, T.; Akaishi, K.; Miyahara, A. (Nagoya Univ. (Japan). Inst. of Plasma Physics). *Journal of Nuclear Materials;* 111: 444-447(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Using the one-dimensional transport equations for impurities and energy flow in the steady-state tokamak plasma, the self-consistent solutions of the impurity density profile and the temperature profile for a reacting DT plasma with the plasma-surface interaction are analyzed. On the basis of these results the influences of the impurities originated from the wall on the central plasma conditions and the Q-value of a reacting plasma are discussed.

24877 **Analysis of the plasma impurity influx from alkali-metal coatings for fusion reactor applications.** DeWald, A.B.; Davidson, J.N. (Georgia Inst. of Tech., Atlanta (USA)); Krauss, A.R.; Gruen, D.M. (Argonne National Lab., IL (USA). Chemistry Div.). *Journal of Nuclear Materials;* 111: 448-453(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Recently, it has been proposed that alkali-metal covered surfaces be applied to magnetic fusion devices as a means of controlling plasma impurity contamination and shielding the substrate from erosion. Monolayer films of alkali metals have been shown to sputter primarily as ions under particle bombardment. Thus, it is thought that a sheath potential and/or magnetic fields encountered by a sputtered ion will return the ion to the surface without entering the plasma. In this paper, we investigate the net wall impurity influx associated with coatings which exhibit substantial secondary ion emission compared with those which sputter only as neutral atoms. Included in the analysis are sputtered substrate atoms. These are sometimes found to be a significant fraction of the total sputtering yield for low-Z alkali monolayers and affect the overall performance of such coatings. Estimates of the impurity influx made in the neighborhood of a sheath potential show that secondary-ion emitting coatings are effective as a means of inhibiting plasma impurity contamination and wall erosion.

24878 **Erosion and redeposition analysis for limiter and divertor impurity control systems.** Brooks, J.N. (Argonne National Lab., IL (USA). Fusion Power Program). *Journal of Nuclear Materials;* 111: 457-458(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24879 **Gettering in ISX-B.** Wooton, A.J.; Edmonds, P.H.; Isler, R.C.; Mioduszewski, P. (Oak Ridge National Lab., TN (USA). Fusion Energy Div.). *Journal of Nuclear Materials;* 111: 479-484(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Gettering is used in the ISX-B tokamak to reduce the impurity concentration. This paper documents the gettering process used, and compares the expected changes in recycling and radiation with those observed experimentally. The enlargement of the operating regime (1/q, anti nsub(e)R/Bsub(phi) space) is discussed. Finally, the effect on one of the objectives of the experimental program, that of obtaining high values of beta, is described.

24880 **ECR discharge cleaning experiment in the JIPP T-II.** Sakamoto, Y.; Ishibe, Y.; Ishii, S.; Okazaki, K.; Oyama, H.; Yano, K. (Institute of Physical and Chemical Research, Wako, Saitama (Japan)); Noda, N.; Kawahata, K.; Kawasumi, Y.; Tanahashi, S. (Nagoya Univ. (Japan). Inst. of Plasma Physics). *Journal of Nuclear Materials;* 111: 485-488(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The first experiment of electron cyclotron resonance discharge cleaning (ECR-DC) on a tokamak device was carried out by using the JFT-2. In the experiment, the cleaning effect was estimated from comparison of QMA (quadrupole mass analyzer) signals of H_2O, CH_4 and CO with those of Taylor-DC, but the influence of ECR-DC on the tokamak discharge plasma was not investigated. In the present work, we focus our attention on the decrease of light impurities (especially oxygen) in tokamak discharge plasma by virtue of ECR-DC. To characterize the tokamak plasma property, the mean plasma resistivity, the intensity of an O II line and the mean electron density without gas puffing were observed. These quantities are expected to decrease with the decrease of impurities.

24881 **Light impurity removal from stainless steel by atomic hydrogen.** Tschersich, K.G.; von Seggern, J. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Grenzflaechenforschung und Vakuumphysik). *Journal of Nuclear Materials;* 111: 489-492(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

This study was intended as a model experiment for discharge cleaning (DC) of plasma vacuum vessels and is a continuation of our previous work on Inconel. The objective of discharge cleaning is the removal of light impurities from the vessel surface.

24882 **Structure of metallic coatings for impurity control in MACROTOR.** Keller, L.; Oren, L.; Taylor, R.J. (California Univ., Los Angeles (USA). Center for Plasma Physics and Fusion Engineering); Schwirzke, F. (Naval Postgraduate School, Monterey, CA (USA). Dept. of Physics); Bunshah, R.F.; Wagner, C.N.J. (California Univ., Los Angeles (USA). Dept. of Materials Science and Engineering). *Journal of Nuclear Materials;* **111**: 493-497(Nov-Dec 1982). Contract AM03-76SF00010.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The properties of atomic metal condensates are to a large extent determined by parameters such as: microstructure, temperature during deposition, interfacial phenomena, and deposit thickness. At elevated first wall temperatures (200-600°C), a homogeneous metallic film deposition can be achieved. For example, hydrogen embrittlement and flaking through hydride formation, currently a problem in fusion devices, can be avoided. The thickness of Ti-layers for acceptable impurity control must be at least a few hundred Angstroms because effective impurity control requires the physical covering of the impurity adsorbents on the surface. It is shown that thick coatings (micron range), which get formed by repetitive Ti-'gettering' in Macrotor, are likely to form a stable first wall, if properly deposited at elevated temperatures.

24883 **Wall conditioning of the JIPP T-II torus by AC discharge cleaning.** Noda, N.; Tanahashi, S.; Kawahata, K.; Kawasumi, Y. (Nagoya Univ. (Japan). Inst. of Plasma Physics); Ishii, S.; Ishibe, Y.; Okazaki, K.; Oyama, H.; Sakamoto, Y.; Yano, K. (Institute of Physical and Chemical Research, Wako, Saitama (Japan)). *Journal of Nuclear Materials;* **111**: 498-501(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

It has been observed that during AC + ECR-DC the H_2O pressure decays faster as the wall temperature is raised. The decay time changes at a point where the pressure reaches a certain level. This suggests that the mechanisms which dominate the cleaning in the later phase are different from those in the earlier phase. By optimizing AC + ECR-DC, we have found that 40 h of discharge cleaning with the wall temperature of 220°C is sufficient to obtain high density tokamak discharges having Zsub(eff) approx. equal to 1.0. A simple model is proposed to analyze the discharge-cleaning process. By comparing a result calculated with this model to the experimental data, we have found that, for optimization, it is essential to raise the electron density of the discharge-cleaning plasma high enough that the dissociation-loss rate of H_2O is as large as the sticking-loss rate.

24884 **Studies of unipolar arcing in the mini-torus.** Duan, W.; Chen, J.; Yang, S. (Southwestern Inst. of Physics, Sichuan (China)). *Journal of Nuclear Materials;* **111**: 502-509(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Unipolar arcs have been investigated in a small tokamak, the Mini-Torus, on probes made of graphite, aluminium, stainless steel, titanium, and molybdenum, exposed to the plasma by time-resolved in situ observations with an endoscope system and a high speed framing camera in conjunction with photoelectric spectral recordings from an optical monochromator. Various types of arcing tracks are observed. Visual and SEM examination of the details of arc craters reveal several interesting features of the structure and motion of unipolar arcings. Special attention has been paid to the 'stationary arcs' with fixed arc spots (giant craters), some of which show a rotational structure.

24885 **Study of the erosion rate of vacuum arcs in a transverse magnetic field.** Sethuraman, S.K.; Chatterton, P.A. (Liverpool Univ. (UK). Dept. of Electrical Engineering and Electronics); Barrault, M.R. (Etablissements Merlin et Gerin, 38 - Grenoble (France)). *Journal of Nuclear Materials;* **111**: 510-516(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The cathode mass loss due to the action of low-current vacuum arcs under the influence of a high transverse magnetic field has been measured for titanium, stainless steel and graphite. The effects of magnetic field, are current and cathode temperature on the erosion rate are investigated. The measured erosion rate decreases marginally with the magnetic field, the total variation being less than 20% and the rate of decrease is much lower at higher fields. Within the experimental accuracy only very small or no increase of erosion rate is observed with the arc current for currents up to 70 A. For measurements made at higher cathode temperatures (upto 500°C) there is a considerable increase in erosion rate for the stainless steel cathode and the results are discussed for titanium and graphite. The importance of clean cathode surfaces in the erosion studies is demonstrated by observing the cathode spot motion using an Image Converter Streak Camera. This method has proved to be an effective diagnostic tool in judging the surface condition before any measurements are made. Prolonged glow discharge cleaning in hydrogen is found to provide an acceptably clean surface. The earlier reported cathode spot velocity measurements are extended to higher magnetic fields.

24886 **Arc velocity and erosion for stainless steel and aluminium cathodes.** Fang, D.Y.; Nuernberg, A.; Bauder, U.H. (Technische Univ. Muenchen (Germany, F.R.). Lehrstuhl fuer Technische Elektrophysik); Behrisch, R. (Association Euratom-Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 517-521(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The velocity of vacuum arcs in a magnetic field and the erosion at the cathode have been investigated for Al + 3% Mg and stainless steel. The arc currents were adjusted between 16.6 A and 70 A and a magnetic induction of 0.02 to 0.1 T was applied. The arc current and the arc velocity can be measured reproducibly only after conditioning of the cathode surface by 20 to 40 arc operations. For conditioned cathodes at room temperature the arc velocities increase with arc current and magnetic induction. For higher cathode temperatures the arc velocity decreases while the erosion yields and the crater size increases.

24887 **Surface interactions in a reverse field pinch.** McCracken, G.M.; Firth, L.; Goodall, D.H.J.; King, R.E.; Lavender, K.E.; Newton, A.A.; Thompson, V.K. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.); Edwards, B.C.; Titchmarsh, J. (UKAEA Atomic Energy Research Establishment, Harwell. Metallurgy Div.). *Journal of Nuclear Materials;* **111**: 522-525(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The principle findings of the investigations were: (1) mechanical deformation occurring at the end of the bellows section adjacent to the weld. (2) Very localised erosion on at least three deformed sections, leading in one case to the puncturing of the liner wall. These eroded spots were all at a region of the liner underneath a gap in the shell. The mechanism whereby the energy is deposited locally is not understood. (3) Deposition of stainless steel as molten droplets was observed over a much larger area adjacent to the shell gap. There is no obvious link between this deposition and the puncture. (4) Arcing is observed over a large proportion of the liner surface: the highest local density of arcs is found on the outer part of the torus, especially near the ports. (5) The inside of the vessel has large coloured areas which were identified as oxide layers probably formed as the result of liner heating by the plasma in the presence of leaks during the last weeks of operation.

24888 **Initiation of arcing at a plasma-wall contact.** Ehrich, H.; Karlau, J.; Mueller, K.G. (Essen Univ. (Gesamthochschule) (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 526-528(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Several years ago wall erosion by unipolar arcs was recognized as a source for impurity production in fusion devices. The mechanisms leading to arcing during plasma-wall interaction have been widely discussed in recent literature for tokamaks as well as for model experiments. However, up to now especially the initiation of arcing and the role of external fields are not well understood. In our investigation the initiation of arcing in a plasma-wall contact was studied by means of a small scale laboratory experiment.

24889 **Thermal processes in tokamaks of the next generation and future reactors.** Vernickel, H. (Association Euratom-Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 531-540(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

In future tokamaks heating power will increase considerably compared with present-day machines. This leads to increased heat loads to surfaces exposed to the plasma. In this paper the models used to calculate the limits for thermal flux imposed by maximum permissible surface temperature and maximum permissible stress are reviewed. Additional constraints for the design resulting from damage caused by disruptions and from erosion by the plasma are mentioned. Different methods of laboratory testing of small samples are surveyed. The designs of the limiters of the next generation of tokamaks are compared.

24890 **Creep deformation of first wall components following a plasma disruption.** Peterson, R.R.; Wolfer, W.G. (Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering). *Journal of Nuclear Materials;* **111**: 541-543(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

We have presented a model for the analysis of transient stresses in a tokamak first wall during a plasma disruption. By completing a representative calculation where excessive melting does not occur and stress relaxation by creep is dominant during the heating phase, we have found that large tensile stresses and plastic deformation should be present in the first wall. In the future, the model will be improved to incorporate a deformation law which includes both creep, plastic deformation, and history-dependent yield stress.

24891 **Modeling the thermodynamic response of metallic first walls during a plasma disruption.** Merrill, B.J.; Jones, J.L. (EG and G Idaho, Inc., Idaho Falls (USA)). *Journal of Nuclear Materials;* **111**: 544-547(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The results indicate that vaporized wall material moves rapidly into the plasma and interaction of the plasma with this vapor produces intense thermal radiation from the vapor. The consequence is a burst of energy deposition on the wall and rapid plasma thermal quench. The significance of these results is the indication of a process that intensifies the rate of energy deposition from a plasma disruption and consequently the extent of wall erosion. Because of assumptions required in the model, the predictions should be considered as approximate. The numerical results are sensitive to the rate of vapor expansion into the plasma and the rate of thermal radiation from the vapor. In future work, models for these processes will be refined.

24892 **Derivation of the power deposition on limiters and divertor targets from time and space resolved thermographical measurements.** Bein, B.K. (Bochum Univ. (Germany, F.R.). Inst. fuer Experimentalphysik); Mueller, E.R. (Association Euratom-Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 548-553(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

From time and space resolved thermographical measurements on limiters or divertor targets in direct contact with the plasma, the power deposited by the plasma on the limiter or divertor plate can be determined by solving the heat conduction equation of the target plate for the incident heat flux at the surface. Based on Green's functions, an expansion solution is derived which can be interpreted to give the surface heat flux for a thermal wave propagating in the interior of the target plate. The reliability and resolution efficiency achievable by this solution are shown in numerical simulations of repeated surface heating and power deposition calculations; even details, such as heat losses after disruptions can be determined quantitatively.

24893 **Dynamics of melting, evaporation, and resolidification of materials exposed to plasma disruptions.** Hassanein, A.M.; Kulcinski, G.L.; Wolfer, W.G. (Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering). *Journal of Nuclear Materials;* **111**: 554-559(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

First wall components exposed to a high energy flux during a plasma disruption experience a sequence of processes which consists of rapid heating, melting, intense evaporation, resolidification, and cool-down. The dynamics of all these processes has an impact on both the melt layer stability and the thermal stress cycle in the component of the first wall that stays solid. The detailed time history of the temperature distribution is accurately computed by solving a two-moving-boundary problem. The time behavior of the melt layer thickness for both stainless steel and molybdenum is calculated for different disruption energies and different energy fluxes. The duration of melting, which is an important factor in determining the melt layer stability under different forces, is calculated for both stainless steel and molybdenum. The duration of the melt layer may in fact be shorter for materials with thicker melt layers. The effect of vapor shielding (the stopping of the incoming plasma ions by the vaporized wall material) on the dynamics of melting is also investigated.

24894 **Melt layer stability following a plasma disruption.** Wolfer, W.G.; Hassanein, A.M. (Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering). *Journal of Nuclear Materials;* **111**: 560-565(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

When hard plasma disruptions produce melting of a surface layer on first wall components, the melt layer is in general also subject to various forces. Among these, the forces produced by eddy currents and the magnetic fields are the most severe, and they may cause the removal of the melt layer. It appears that one of the most effective mechanisms for removal is by a Rayleigh-Taylor instability. Numerical results are presented for both the most critical wavenumber and its amplification exponent as a function of two parameters which account for the effect of viscosity and surface tension. The results given for the critical amplification exponent allow an easy assessment of the stability of a melt layer when the forces are known. Examples of such an assessment are given, and it is found that within the range of estimated eddy-current forces, the melt layer may or may not be stable. Hydrodynamic instabilities induced by flow and tangential forces appear to be less severe than the Rayleigh-Taylor instability.

24895 **Scaling laws for thermal behavior of inertially cooled limiters allowing for temperature-dependent material properties.** Mast, F.; Vernickel, H. (Association Euratom-Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 566-568(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

The use of temperature-averged thermophysical material properties allows fairly accurate (to within 20%) calculations of temperature rise and temperature distributions in inertially cooled parts of tokamaks. Thus the scaling laws derived for constant coefficients, as e.g. the scaling of permissible power load approx. equal to t - sup(1/2) remain valid even for materials with pronounced temperature dependence of thermophysical properties, provided cases with similar temperature sweep are compared. This is no longer true if radiated power at the end of the pulse exceeds 10% of the incident power, since then corrections for radiation cooling are important.

24896 **Changes in limiter surface temperature profiles for small radius plasmas in Doublet III.** Taylor, T.; Brooks, N. (General Atomic Co., San Diego, CA (USA)); Ioki, K. (Japan Atomic Energy Research Inst., Tokai, Ibaraki; Mitsubishi Atomic Power Industries, Inc., Tokai, Iabaraki (Japan)). *Journal of Nuclear Materials;* **111**: 569-572(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

In the present generation of tokamaks, the thermal flux capabilities of inertially cooled in-vessel components is limited to approx. equal to 1 kW cm^{-2} for pulse lengths of a few seconds. To handle the increased heat flux expected in high-energy-density tokamaks, the effective area of limiter-plasma interaction will need to be increased. Effective utilization of the available limiter surface area requires an understanding of the thermal flux pattern. The details of the thermal flux are especially important in the design of more sophisticated or multi-purpose limiters, such as pumped limiters. We report here measurements of the surface temperature of the limiter in Doublet III during reduced-minor-radius, ohmically heated discharges, and compare the measured surface temperature profiles with those predicted by a simple heat-flux model.

24897 **Damage and modifications in the Frascati tokamak limiter.** Ferro, C.; Franconi, E.; Neri, A. (Associazione Euratom-CNEN sulla Fusione, Centro di Frascati (Italy)). *Journal of Nuclear Materials;* **111**: 573-576(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Post-mortem observations of the limiter give some information about its behavior over a large number of different discharges. The outstanding phenomena observed on the limiter can be summarized as follows: (1) The erosion of the limiter and the amount of energy deposited are much lower than those predicted by the standard models, but are in agreement with the concept of 'virtual limiter'. (2) The shape of the limiter surface plays an important role on the heat load distribution, mainly during the steady state. (3) The floating potential of the limiter resulting from electron temperature is below the threshold for arcing (no arc tracks have been observed). (4) The fluence of hydrogen isotopes in the ion side is higher than the saturation value (blistering).

24898 **Deuterium trapping in low-Z coatings.** Erents, S.K. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.). *Journal of Nuclear Materials;* **111**: 590-597(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Measurements of deuteron trapping in a series of low-Z wall coatings, proposed for use in JET, are reported. Mass spectrometry has been used to study the re-emission of incident ions of 100 eV-2 keV D_3^+ during bombardment at implant temperatures of between 300 K and 1100 K. Titanium carbide coatings of 20 μm thickness are found to trap large quantities of deuterium at temperatures <= 800 K. Other samples, including alumina, silicon and titanium dioxide all show a saturation behavior following ion doses >= 10^{18} deuterons cm^{-2}. Under certain bombardment conditions an increase in trapping is recorded as the implant temperature is increased from 600 K to 800 K. The implications of these results for the tritium inventory when using D/T plasmas is discussed.

24899 **Some factors affecting the dynamics of a plasma-wall interaction simulator.** Clausing, R.E.; Heatherly, L.; Emerson, L.C. (Oak Ridge National Lab., TN (USA). Metals and Ceramics Div.). *Journal of Nuclear Materials;* **111**: 636-641(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Isotope mixing and thermal desorption from samples exposed in a glow discharge apparatus were used to study the factors affecting hydrogen recycle and wall inventory. Conditions were chosen to be similar to those expected at the walls in today's experimental fusion devices. The size and nature of the hydrogen reservoir in the wall after plasma pulses was investigated by thermal desorption techniques. Large amounts of deuterium, i.e., 5 x 10^{15} D cm^{-2} remain in the sample 4 min after a single 200 ms plasma pulse. While this result may be explained by a model using bulk diffusion and traps, it is suggested that either a spectrum of desorption energies, or a concentration dependent recombination coefficient, may also be useful in describing the thermal desorption processes. Experiments with various pumping conditions show that readsorption of molecular hydrogen isotopes on the wall should be considered in modeling hydrogen recycle and isotope changeover processes. HD formation without plasmas confirms the role readsorption plays.

24900 **Experimental observation of a non-constant recombination coefficient - H/Pd(110); possible implications for hydrogen recycle in tokamaks.** Carter, W.B. (Oak Ridge National Lab., TN (USA). Metals and Ceramics Div.). *Journal of Nuclear Materials;* **111**: 657-659(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24901 **Tritium permeation in fusion reactor first walls.** Baskes, M.I.; Bauer, W.; Wilson, K.L. (Sandia National Labs., Livermore, CA (USA)). *Journal of Nuclear Materials;* **111**: 663-666(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

For a stainless steel wall subjected to an energetic tritium charge-exchange neutral flux, the tritium permeation rate and tritium inventory through the first wall can be quite large. The magnitude of the effect is critically dependent on the temperatures and surface conditions assumed for the wall as well as the character of the neutron damage traps. The time to steady-state depends almost entirely upon trapping characteristics. For INTOR-like conditions, a steady-state rate of approx. equal to 10^{-3} g/day is possible under optimum conditions while for a first wall at more elevated temperatures (such as DEMO [32]) the tritium permeation rate can easily exceed 1 g/day. These tritium permeation rates can be reduced significantly by the use of permeation barriers at the first-wall-plasma or first-wall-coolant interfaces.

24902 **Advanced materials for in-vessel components.** Mattox, D.M.; Davis, M.J. (Sandia National Labs., Albuquerque, NM (USA)). *Journal of Nuclear Materials;* **111**: 819-826(Nov-Dec 1982). Contract AC04-76DP00789.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Advanced materials for fusion reactor applications will involve development of structural material for a radiation environment as well as special materials for specific properties such as impurity control, hydrogen recycling, tritium retention, tritium permeation and high thermal inputs. One of the most important materials development areas will be layered composites which are designed to optimize the functional requirement of the materials. This paper reviews some of the concepts presently being pursued to develop advanced layered composite materials for fusion applications.

24903 **Studies of chromium gettering.** Simpkins, J.E.; Mioduszewski, P. (Oak Ridge National Lab., TN (USA). Fusion Energy Div.); Stratton, L.W. (Carleton Coll., Northfield, MN (USA)). *Journal of Nuclear Materials;* **111**: 827-830(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Preliminary results have shown that hydrogen pumping by chromium is a surface effect. Unlike with titanium, the getter material used in many present day tokamaks, there is no significant diffusion into the bulk. This feature, which would minimize the tritium inventory, makes chromium a viable alternate to titanium gettering for future tokamaks. Additional experiments have been carried out to measure the basic characteristics of chromium films for gases of interest in tokamak research. These gases include deuterium, oxygen and nitrogen. A vacuum system is described which allowed precise control of the test gas, a constant wall temperature and determination of the projected getter surface area. A quadrupole mass spectrometer, rather than simply a total pressure gauge, was utilized to measure the partial pressure of the test gas as well as the residual gas composition in the system. A quartz crystal monitor was used to measure film thickness. Pumping speeds and sticking coefficients are given as a function of surface coverage for each test gas. A comparison will be made with titanium films deposited in the same vacuum system and under similar conditions.

24904 **Surface segregation in binary alloy first wall candidate materials.** Gruen, D.M.; Krauss, A.R.; Mendelsohn, M.H.; Susman, S. (Argonne National Lab., IL (USA). Chemistry Div.; Argonne National Lab., IL (USA). Solid State Science Div.). *Journal of Nuclear Materials;* **111**: 831-838(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

We have been studying the conditions necessary to produce a self-sustaining stable lithium monolayer on a metal substrate as a means of creating a low-Z film which sputters primarily as secondary ions. It is expected that because of the toroidal field, secondary ions originating at the first wall will be returned and contribute little to the plasma impurity influx. Aluminum and copper have, because of their high thermal conductivity and low induced radioactivity, been proposed as first wall candidate materials. The mechanical properties of the pure metals are very poorly suited to structural applications and an alloy must be used to obtain adequate hardness and tensile strength. In the case of aluminum, mechanical properties suitable for aircraft manufacture are obtained by the addition of a few at% Li. In order to investigate alloys of a similar nature as candidate structural materials for fusion machines we have prepared samples of Li-doped aluminum using both a pyrometallurgical and a vapor-diffusion technique. The sputtering properties and surface composition have been studied as a function of sample temperature and heating time, and ion beam mass. The erosion rate and secondary ion yield of both the sputtered Al and Li have been monitored by secondary ion mass spectroscopy and Auger analysis providing information on surface segregation, depth composition profiles, and diffusion rates. The surface composition ahd lithium depth profiles are compared with previously obtained computational results based on a regular solution model of segregation, while the partial sputtering yields of Al and Li are compared with results obtained with a modified version of the TRIM computer program.

24905 **Behavior of hot titanium getters at the plasma edge in tokamaks.** Schwirzke, F. (Naval Postgraduate School, Monterey, CA (USA)); Keller, L.; Oren, L.; Taylor, R.J. (California Univ., Los Angeles (USA). Center for Plasma Physics and Fusion Engineering). *Journal of Nuclear Materials;* **111**: 844-847(Nov-Dec 1982). Contract AM03-76SF00010.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

In preparation for the hot wall Microtor experiment, the surface of a titanium ball has been exposed to power discharges in Macrotor while being heated up to various temperatures in the range of 20-1000°C. Relative sputtering yields of Ti, O, and C as a function of the surface temperature were determined spectroscopically by biasing the Ti-ball negative up to 1 kV during the tokamak discharge. Under the synergetic influence of surface temperature, sheath potential, hydrogen and oxygen loading, the sputtering increases markedly with temperature. Ti contaminated with oxygen shows severe arcing at low sheath potentials. The arcing threshold of a biased Ti-ball depends on previous surface treatment and arc damage.

24906 **Thermal shock testing of low-Z coatings for JT-60.** Nakamura, K.; Yamada, R.; Saidoh, M.; Murakami, Y. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). *Journal of Nuclear Materials;* **111**: 852-855(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24907 **Thermal fatigue testing of low-Z coatings on molybdenum and Inconel 625.** Yamada, R.; Nakamura, K.; Saidoh, M.; Murakami, Y. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). *Journal of Nuclear Materials;* **111**: 856-860(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24908 **Development of low-Z surface coatings for JT-60 first wall.** Murakami, Y.; Abe, T.; Nakamura, H. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). *Journal of Nuclear Materials;* **111**: 861-863(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24909 **Outgassing characteristics of TiC coated materials.** Sukenobu, S.; Gomay, Y. (Toshiba Corp., Kawasaki, Kanagawa (Japan)). *Journal of Nuclear Materials;* **111**: 864-865(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24910 **Thermal fatigue of a TiB_2 coated, long pulse, high heat flux component.** Whitley, J.B.; Mullendore, A.W.; Watson, R.D.; Smith, M.F.; Blewer, R.S. (Sandia National Labs., Albuquerque, NM (USA)). *Journal of Nuclear Materials;* **111**: 866-867(Nov-Dec 1982). Contract AC04-76DP00789.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN (USA) (3 - 7 May 1982).

Published in summary form only.

24911 **Helium embrittlement of stainless steels at ambient temperature.** Caskey, G.R. Jr.; Rawl, D.E. Jr.; Mezzanotte, D.A. Jr. (DuPont, Aiken, SC, USA). *Scripta Metallurgica;* **16**: No. 8, 969-972(Aug 1982).

Notched C-shaped specimens were machined from five stainless steels: Type 304L, Type 316, Nitronic-40, A286, and a modified A286. The modified A286 was in the annealed condition, all others were high-energy-rate forged. 12 refs.

24912 **Nuclear analysis of a d-d tokamak reactor design, wildcat.** Jung, J. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 519(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

24913 Stability of Doublet III plasmas against axisymmetric resistive MHD modes. McLain, F.W.; Jensen, T.H. (General Atomic Co., San Diego, CA (USA)). *Journal of Plasma Physics;* **26**: 431-440(Dec 1981).

A study is presented of the stability of doublet plasmas in the Doublet III device against resistive axisymmetric MHD modes. The real characteristics of the device were modelled as accurately as possible. Stabilization is discussed and numerical examples are given, and the relationship between the results obtained and experimental observations from Doublet III is discussed.

24914 Feedback stabilization of tokamaks against slow axisymmetric MHD instabilities. Jensen, T.H. (General Atomic Co., San Diego, CA (USA)). *Journal of Plasma Physics;* **26**: 351-357(Oct 1981).

A formalism for the stability analysis of a system consisting of the plasma, surrounded by a conducting wall or vacuum chamber and coils with their control system is described.

24915 Helios: a 15 TW carbon dioxide laser-fusion facility. Carlson, R.L.; Carpenter, J.P.; Casperson, D.E.; Gibson, R.B.; Godwin, R.P.; Haglund, R.F. Jr.; Hanlon, J.A.; Jolly, E.L.; Stratton, T.F. (Los Alamos National Lab., NM). *IEEE (Institute of Electrical and Electronics Engineers) Journal of Quantum Electronics;* **QE-17**: No. 9, 1662-1678(Sep 1981).

Helios is an eight-beam carbon dioxide laser and target facility for the study of laser-fusion processes. The design of the laser is based on the principle of the electron-beam controlled high-pressure electrical discharge. The eight beams deliver a total of 9 kJ to targets in subnanosecond pulses and the peak intensity at focus exceeds 10^{16} W/cm^2/beam. The laser can be fired at 5 min intervals but the system shot rate is restricted to 2/h because of target insertion, alignment, and preparation of diagnostic systems.

24916 Plasma wake of mesosonic conducting bodies. Pt. 1. An experimental parametric study of ion focusing by the plasma sheath. Stone, N.H. (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center). *Journal of Plasma Physics;* **25**: 351-371(Jun 1981).

An experimental parametric investigation is made of the disturbed ion flow field immediately downstream from conducting bodies of spherical and long cylindrical geometries in a collisionless, mesosonic plasma stream. The ion-acoustic Mach number, S, and the normalized test body potential, PHIsub(b), are varied, while the test body radii are of the order of a Debye length for all cases. In addition to standard diagnostics, the ion flux intensity, energy and direction are measured with the recently developed differential ion flux probe. Results are in good agreement with theoretical calculations that include the effects of the test body and space charge potentials.

24917 Bumpy Z-pinch. Jensen, T.H.; Chu, M.S. (General Atomic Co., San Diego, CA (USA)). *Journal of Plasma Physics;* **25**: 459-464(Jun 1981).

The 'bumpy Z-pinch' is a magnetic configuration with potential usefulness for fusion reactors. A conceptually simple version of the configuration is axisymmetric. It contains regions of closed and open field lines. Assuming that the plasma spontaneously maintains an equilibrium it is possible to maintain indefinitely the regions of closed field lines by driving an axial current through the plasma in the region of open field lines. The ratio between the total axial driven current and the total poloidal current in each of the tokamak-like regions can, in principle, be made arbitrarily small, which means that the load impedance can be arbitrarily large. In addition, the configuration has the inherent virtue similar to that of the spheromak that the tokamak-like part of the plasma does not link any material coils.

24918 Design and fabrication considerations for normal copper pf coils located inside tf coils to facilitate replacement. Ayers, J.W.; Srivastava, V.C. (Magn Corp of Am, Waltham, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 162-165(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The location of the Poloidal Field (PF) coils inside the Toroidal Field (TF) coils in tokamak fusion reactors is highly desirable to minimize the cyclic loading and associated heat loads due to ac losses in TF coils. Fusion devices of this configuration built to date have not emphasized coil and coil structure design of fabrication features which facilitate replacement of the PF coils in the event of a failure during operation. This means excessive machine downtime and high costs which make this approach to future machines appear very unattractive. However, based on studies on PLT and TFTR this paper discusses some of the problems involved with replacement of normal copper coils located inside TF coils, as well as suggested design alternates. This may be helpful in the design of tokamak reactors with similar coil configuration.

24919 Epoxy impregnation system for TFTR large coil program. Chrzanowski, J.H.; Pereira, M.A.; Snook, P.G. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 339-341(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TFTR Large Poloidal Coil Program required PPPL to mix and handle the quantity of epoxy ever used at a single time on any fusion related program. Close to 250 gallons of epoxy were required for the largest of the poloidal coils fabricated. Special safeguards and procedures were required to ensure a safe and controlled epoxy system. Before the program could begin, tests had to be performed to determine the mechanical property variances due to differing cycles of gelation and cure. These tests, plus tests performed during and just preceding impregnation will be analyzed within this paper.

24920 Low density cavity gas fireball dynamics in the light ion beam target development facility. Peterson, R.R.; Lee, K.J.; Moses, G.A. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 668-671(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

First wall survivability is a critical problem in the design of Inertial Confinement Fusion reactor cavities. Recent calculations of wall stresses show that in a TDF, thermal stresses are much larger than mechanical stresses and that the maximum total stress is considerably larger than the yield stress for the ferritic steel. It is proposed that a graphite fabric liner be inserted on the inside edge of the cavity wall to reduce the total stresses in the wall to below the yield stress.

24921 Local controls and instrumentation for MFTF. Peterson, R.L. (Lawrence Livermore Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 949(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

24922 Effect of a transverse magnetic field on liquid metal two-phase flow pattern. Gherson, P.; Lykoudis, P.S. (Purdue Univ, West Lafayette, Indiana, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1410-1413(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

24923 Thermal performance of EBT-P vacuum concepts. Hellwig, T.M.; Bowers, D.A. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1705-1708(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The choice of vacuum vessel seals and wall material has been an important issue in the design of EBT-P. A stainless steel vessel is desired from seals consideration of the EBT-P environ-

ment. The objective of this study was to identify and evaluate various actively-cooled stainless configurations that could withstand steady state operation at heat fluxes up to 20 W/cm/sup 2/. Three stainless steel concepts were examined in detail; a skin and tube copper backed concept. Detailed thermal analysis was conducted on each concept using a two-dimensional finite difference code.

24924 **Effect of curing condition on the concrete moisture retention and its shielding implication for the design of fusion facilities.** Huang, S.; Chang, J.; Amin, S.; Palmrose, S.; Paxton, J. (Ralph M. Parsons Co, Pasadena, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1909-1911(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Teste were conducted to determine the moisture retention for the 0.5 wt% borated concrete under three curing conditions. The three curing conditions are (1) curing at 100% relative humidity for a 28-day period at 21/degree/C, (2) curing at 100% relative humidity for a 7-day period, then at air-dry 50% relative humidity for the remaining 28-day curing period at 21/degree/C, and (3) curing at 100% relative humidity for a period of 7 days and then curing at air-dry 20% relative humidity for the remaining curing period at 21/degree/C. The concrete shielding curves are presented for several mositure contents. The results should be helpful to assist the design of a cost effective concrete shield for fusion facilities.

24925 **Conception, implementation and performance of the high power, high frequency amplifier for icrh at Fontenay-aux-Roses, France.** Sire, G.; Gerlach, P.; Kalfon, C. (Thomson-CSF, Gennevilliers, Fr). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2113-2117(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The great success of the trials of Ion Cyclotron Resonance Heating (ICRH) conducted at the Centre for Nuclear Research at Fontenay aux-Roses, France using a 500 kW source led to the decision to increase the power levels employed to 3 MW. Two 1.5.MW sources were constructed and have been in operation since March 1981. Guide-lines for the design of the 1.5 MW amplifier stage, practical implementation of the design using a single tube output stage, test procedures and performance figures are given. An account of the difficulties encountered, originating both from the amplifier itself and particular conditions of use, and the methods by which these problems are overcome are included.

24926 **R.f. system for Alfven wave heating of the TCA tokamak.** Lietti, A.; Vugmann, G.; Cheetham, A.D. (Ec Polytech Fed de Lausanne, Switz). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 835-838(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A 2-5 MHz, 2MW oscillator for Alfven wave heating is described. The matching system is discussed and a method of estimating the coupling with the plasma during Tokamak operation is reported.

24927 **Design, fabrication and testing of a model heating and cooling system for a vacuum vessel.** Shimizu, M.; Miyauchi, Y.; Nakamura, H.; Kajiura, S.; Koizumi, M.; Hata, M. (Jpn At Energy Res Inst, Tokai). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1641-1644(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A full-size model of a typical cooling and heating system for a vacuum vessel was manufactured and examined in order to clarify and enhance the efficiency and reliability of the designed system. The model consisted of two parts; one of which had the same structure as the other and was located facing each other to simulate the adiabatic condition of the vacuum-side of a vacuum vessel. Its components were rectangular plates, eletric heater units, cooling pipes inside of which water and air flew as cooling fluid. A lot of kinds of tests and measurements were performed to evaluate efficiency and reliability on the model. The numerical and theoretical analyses on the system were also carried out using the dimensional finite difference technique. The analytical results agreed pretty well with the experimental.

24928 **Large source test stand for H/sup -/(D/sup -/) ion source.** Larson, R.; McKenzie-Wilson, R. (Brookhaven Natl Lab, Upton, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1490-1493(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Brookhaven National Laboratory Neutral Beam Group has constructed a Large Source Test Stand for testing of the various source modules under development. The first objective of the BNL program is to develop a source module capable of delivering 10A of H-(D-) at 25 kV operating in the steady state mode with satisfactory gas and power efficiency. The large source test stand contains gas supply and vacuum pumping systems, source cooling systems, magnet power supplies and magnet cooling systems, two arc power supplies rated at 25 kW and 50 kW, a Large battery driven power supply and an extractor electrode power supply. Currently two types of sources are under test: a large magnetron source and a hollow cathode discharge source.

24929 **Optimization studies of a commercial EBTR power plant.** Zuckerman, D.S.; Bathke, C.G. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1839-1842(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Parametric studies of a commericl Elmo Bumpy Torus Reactor (EBTR) have been conducted based on conceptual design performed by Los Alamos National Laboratory and McDonnell Astronautics Company. These studies were designed to determine the optimum combination of five parameters - number of sectors, major radius, average minor plasma radius (r/sub p/), average magnetic field, and ratio of current in an aspect ratio enhancement coil to toroidal field coil current - which would produce the lowest bus bar cost of electricity (COE). The parametric studies were performed in order to determine trends resulting from changes in various combinations of parameters.

24930 **Conceptual plant design for a commerical EBT reactor.** Barry, K.; Waganer, L. (Ralph M. Parsons Co, Pasadena, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1847-1850(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Conceptual plant design for the EBT reactor reflects a logical integration of systems and components unique to the fusion industry with their balance of plant supporting facilities. The design is based on steady state operation to maxmize overall facility reliability. The primary coolant is pressurized water that is used in both the the first wall/blanket and limiter cooling circuits. The reference thermal reactor power for this four loop plant is 4000 MW; approximately 1210 MW of electrical energy is delivered to the grid.

24931 **OHTE reactor concepts.** Bourque, R.F. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1851-1854(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

OHTE is expected to be an improvement over the reversed field pinch in that the stabilizing reversal of edge toroidal field is augmented by external helical windings rather than totally relying on a dynamo effect. Reactors should be characterized by high power density, small size, moderate magnetic fields, room temperature coils, and ohmic heating to ignition. Five reactors have been studied self-consistently using a comprehensive systems code developed at General Atomic. It is shown that the development increments requird for OHTE commercialization are smaller and lower

plants cost than for tokamaks, and that commerical plants should be economically and technically attractive.

24932 **Conceptual design studies of the Modular Stellarator Reactor (MSR).** Miller, R.L.; Krakowski, R.A. (Los Alamos Natl Lab, NM, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1863-1866(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A preliminary conceptual study has been made of the Modular Stellarator reactor (MSR) as a steady-state, ignited, DT-fueled, magnetic fusion reactor. The MSR concept combines the physics of classic stellarator confinement with an innovative, modular-coil design. Parametric tradeoff calculations are described, leading to the selection of an interim design point for a 4.8-GWT plant based on Alcator transport scalilng and an average beta value of 0.04 in an /L-SCRIPT/? 2 system with a plasma aspect ratio of 11.

24933 **Prototype moving-ring reactor.** Smith, A.C. Jr.; Ashworth, C.P.; Abreu, K.E. (Pac Gas and Electr Co, San Francisco, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1867-1870(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The objective of this work was to design a prototype fusion reactor based on fusion plasmas confined as "Compact Toruses.' Six major criteria guided the prototype design. The prototype must: (1) produce net electricity decisively (P/sub net/ >70% of P/sub gross/), with P/sub net/ approximately 100 MW(e); (2) have small physical size (low project cost) but commercial plant; (3) have all features required of commerical plants; (4) avoid unreasonable extrapolation of technology; (5) minimize nuclear issues substantially, i.e. accident and waste issues of public concern, and (6) be modular (to permit repetitive fabrication of parts) and be maintainable with low occupational radiological exposures.

24934 **Prospects of low activation fusion reactor design.** Hopkins, G.R.; Cheng, E.T.; Maya, I.; Wong, C.P.C.; Schultz, K.R. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1871-1874(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A design study was performed to investigate the implications of using low activation materials in a fusion power reactor. Using the STARFIRE reactor as a model, low activation design concepts were studied for the four major regions of a fusion reactor: first wall and limiter, blanket, shield, and magnet windings. The first wall and limiter are made of water-cooled aluminum. The blanket uses an unpressurized silicon carbide structure contaning Li/sub 2/O breeding material with high temperature, high pressure helium coolant contained in SiC "thimble tubes". The shield is made of SiC and B/sub 4/C aluminum stabilizer and aluminum or carbon fiber epoxy composite for the structure and dewar. The low activation concept can allow fusion to provide an even greater level of inherent safety and thus an even more environmentally acceptable source energy.

24935 **Sensitivity study code for tokamak devices.** Kasai, M.; Nishikawa, M.; Kameari, A.; Yanagiawa, I.; Ueda, N.; Tone, T.; Hiraoka, T. (Mitsubishi At Power Ind Inc, Saitama, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1880-1883(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A FORTRAN code has been developed to conduct sensitivity study for Tokamak devices on physics and engineering parameters. This code is applicable to various kinds of tokamak systems from experimental devices to reactors. The code calculates configuration parameters, weights of components, required power supply capacity and some technological requirements as a function of main plasma parameters and machine parameters. The present version of this code had been successfully applied to parametric studies for INTOR, SPTR (Swimming Pool Tokamak Reactor) and other devices, and will be further improved.

24936 **Methodology for investigating subsystem interactions in a tokamak fusion reactor.** Reierson, J.D.; Menke, J.L. (MITRE Corp, McLean, VA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1884-1887(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A methodology is developed for identifying and tracking the interactions between the subsystems of a magnetic fusion device and a preliminary analysis is completed of the subsystem interactions of a hypothetical D-T tokaamk reactor. This methodology can be useful in program justification, program management, design change control, and critical path analysis of future fusion devices.

24937 **Electric power from near-term fusion reactors.** Longhurst, G.R.; Deis, G.A.; Miller, L.G. (EG and G, Idaho Falls, Idaho, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1888-1891(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper examines requirements and possbilities of electric power production on near-term fusion reactors using low temperature cycle technology similar to that used in some geothermal power systems. Requirements include the need for a working fluid with suitable thermodynamics properties and which is free of oxygen and hydrogen to facilitate tritium management. Thermal storage will also be required due to the short system thermal time constants on near-time reactors. It is possbile to use the FED shield in a binary power cycle, and results are presented of thermodynamic analyses of this system.

24938 **Engineering challenges of underground contained fusion.** Hammond, R.P.; Dooley, J.L. (R and D Assoc, Marine del Rey, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1892-1893(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

There are three main challenges of engineering the first reactor: One problem occurs at the interface between chamber wall and the pipes which must enter to remove steam, return water, and add new charges. Another is the continuous filtration of watr returning to the chamber or of the steam leaving it to remove radioative particulates, which must be prevented from accumulating. A third engineering problem is design of a production line for the charges themselves and for their introduction and final assembly by remote control far underground.

24939 **UWTOR-M, a conceptual design study of a modular stellarator power reactor.** Sviatoslasky, I.N.; Van Sciver, S.W.; Kulcinski, G.L. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1894-1897(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A preliminary design of a 5500 MW/sub th/ modular stellarator power reactor, UW-TOR-M, is presented the parametric considerations which led to the UWTOR-M reference design point are briefly describe. A unique blanket design is proposed which minimized tritium inventory in the reactor. Finally, sine maintainability is a prime consideration, a scheme for is described servcing the first wall/blanket and other reactor components.

24940 **Sheromak approach to high power density reactors.** Olson, R.E.; Gilligan, J.G.; Greenspan, E.; Miley, G.H. (Univ of Ill, Urbana, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1898-1900(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The low power density and large physical size of a tokamak power reactor May render may render it an unacceptable energy

source from a captial investment viewpoint. The present paper, examines some of the features of a Spheromak reactor in which the plasma power density is approximately 50-100 times that of a comparable tokamak. Additional advantages of the Spheromak include reduced requirements on applied magnetic field, a cylindrical coil/blanket geometry, and a flexibility in reactor size in the 100-1000 Mw/sub e/ range.

24941 **Overview of the Tandem Mirror Experiment-Upgrade.** Chargin, A.K.; Calderon, M.O.; Wieskamp, T. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1929(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Tandem Mirror Experiment-Upgrade (TMX-U) is a new experiment in tandem micrror physics. It uses some of the components of the first Tandem Mirror Experiment (TMX), which was shut down in October, 1980 after successfully operating for more than one year. TMX-Upgrade incorporates additional electrostatic plugging due to electron thermal barriers and microwave heating. This paper is an overview of the TMX Upgrade design and construction.

24942 **Engineering design of TFTR and it's impact on future tokamaks.** Sabado, M.M. (Ebasco Serv Inc, New York, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1930(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

TFTR is a second generation tokamak whose key objective is scientific break-even. TFTR is expected to be the first machine to demonstrate proper combination of plasma confinement time, density, and temperature to obtain this objective. A summary of major TFTR design parameters, including TFM, is presented, and their potential impact on future tokamaks discussed. Details of the updated engineering design and analysis of components are described. Status of major hardware fabrication, assembly installation and test are reviewed. TFTR features, technology, predicted performance and their potential implication for future tokamaks are summarized.

24943 **Operational experience with the ASDEX divertor tokamak.** Wesner, F.; Rapp, H.; Schneider, F. (EURATOM, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1931-1934(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The first one and a half years of operation of the ASDEX divertor tokamak have yielded many results of major technological interest. The most important of these are described and the reasons for the following characterisitics are analyzed: the large stability and reproducibility of discharges, the unexpectedly small loop voltage for breakdown, and the possibility of influencing the disruptive instability.

24944 **Start-up and operation of the Texas Experimental Tokamak.** Brower, D.; Gentle, K.; Harris, W.; Hutchins, S.; Terry, D.R.; Nelin, K.; Wildi, P. (Univ of Tex, Austin, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1935-1938(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Texas Experimental Tokamak (TEXT) has been in operation since November 1980. It is now (Oct 1981) operating routinely at I/sub p/?300kA, B/sub T/?2.5 T and has passed test runs at the full design level at 3 T. No significant problems have arisen in the Tokamak itself. Increases in the operating level lhave been paced bh de-bugging and modification of the Toroidal Field Power Supply. However, this supply is working extremely well. It appears that at the full field and pulse length, additional voltage swing and possbuikle operating regimes.

24945 **Modification of Doublet III to a large dee facility.** Davis, L.G.; Rawls, J.M. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1939-1942(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

General Atomic Company's Doublet III tokamak now in its fourth year of operation, is dedicated to investigating non-circular plasmas. The first three years constituted the ohmic heating phase were circular, doublet, and dee configurations were studied. Reactor-like densities were achieved to assure adequate target plasmas for the neutral beam heating phase now beginning. Emphasis during neutral beam heating will be on does where IOMV of heating power will ultimately be delivered. Impurity control via magnetic limiters or simplified divertors will be further studed during the heating experiments. Electron Cycltron Heating (ECH) will add 1-2 MW of heating and provide for current profile control.

24946 **Engineering tests and performance of screw pinch device TPE-2, with non-circular cross-section.** Ikeda, N.; Kiyama, S.; Takeda, S. (Electrotech Lab, Ibaraki, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1943-1946(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Some results of the assembling, electrical tests and performance of the screw pinch device TPE-2, with a non-circular cross-section are presented. The main object of the experiments is to attain the long confinement of the fat and high beta plasma produced by the fast shock heating in the screw pinch mode with a force free current and the high beta tokamak mode. plasma, we chose the fat torus and non-circular The another object is to develop the high voltage engineering with the aim of a high beta pulsed reactor.

24947 **Design principles for a large RFP experiment.** Phillpott, J.; Rostagni, G.; Di Marco, J. (Culham Lab, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1947-1950(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An RFP experiment (RFX) has been designed by an International Design Team, by groups of collaborating physicists and engineers working in their home laboratories. This international collaborative project has been brought to an advanced stage of system and component design by the co-operation of three design teams under the co-ordination of a Design Manager, based at Culham Laboratory. The paper summaries the important design principles for an RFP device, based on the outcome of this collaborative design project.

24948 **TPE-1R (M) reversed field pinch experiment.** Shimada, T.; Hirano, Y.; Maejima, Y.; Ogawa, K. (Electrotech Lab, Ibaraki, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1951-1954(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This report describes the engineering aspects of the design, tests, and performances of the toroidal device TPE-1RM with which plasma physics researches on "Reversed Field Pinch"configurations are carried out and this is an intermediate scale like HBTX-1A, ZT-40M, and ETA-BETA II. In TPE-1RM experiments are being performed in order to obtain an optimum reversed field configurations for MHD stability. The main description in this report is devoted to the metal vacuum vessel and specially contrived electrical circuit for field programming control techniques. The experiments with this device have been successful both from the technical and physcial points of view.

24949 **Comparison of numerical solutions of the shell stress analysis for a large RFP experiment.** Schrefler, B.A.; Majorana, C.E. (Univ of Padova, Italy). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1955-1958(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Mechanical behaviour of the toroidal shell of a large RFP experiment is investigated by means of several finite elements models. A semi-analytical model is applied to analyze the half of the torus contained between two minor gaps. This model allows for a realistic simulation of the applied forces and hence gives a good picture of the stress states around the point loads. It is also shown that simpler models such as the axisymmetric one or a model composed by pipe elements are indadequate for this purpose.

24950 **Challenges of designing fusion reactors for remote maintainability.** Mason, L.S. (EG and G, Idaho Falls, Idaho, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1959-1962(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

One of the major problems faced by the fusion community is the development of the high level of reliability required to assure that fusion will be a viable commercial power source. Much of the responsibility for solving this problem falls directly on the designer in developing concepts that have a high level of maintainability. The problems are both near-term, in developing maintainability for next generation engineering oriented reactors; and long range, in developing full maintainability for the more commercial concepts with their required high level of on-line time. The near-time challenge will include development of unqiue design concepts to perform inspection, maintenance, replacement, and testing under the stringent conditions imposed by the next generation engineering oriented machines. The long range challenge will focus on basic design concepts that will enable the full mainatability required by commerical fusion.

24951 **Engineering aspects of a D-D commercial tokamak reactor.** Evans, K. Jr.; Baker, C.C.; Brooks, J.N. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1976-1979(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper presents some of the engineering aspects of WILDCAT, a conceptual design of a D-D tokamak, fusion reactor. This conceptual design has evolved from initial studies of D-D tokamak reactors, and is intended to be a study of a later-model, commerical fusion reactor in the same sense that STARFIRE was such a study for D-T fuel cycle. The major guidelines of the study have been to utilize as fully as possible the advantages of the D-D fuel cycle but to avoid unnecessary extrapolations of parameters from existing D-T designs, in particular STARFIRE. The paper consists of an overview of the reference design, a description of each of the major engineering systems (rf current drive, burn cycle, impurity control, first wall, blanket/shield, TF magnets, and tritium system, and a summary of conclusions).

24952 **Engineering needs of a TRACT fusion reactor program.** Willenberg, H.J.; Churchill, T.L.; Hoffman, A.L. (Math Sci Northwest Inc, Bellevue, WA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1984-1987(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TRACT concept is under development as a vehicle for developing small fusion reactors based on compact torus (CT) plasmas. The success of the TRACT program could result in pilot plant fusion facilities which are capable of producing net electric power at about the cost of current large plasma physics experiments. The physics basis for TRACT is a CT plasmas formed by a carefully programmed field-reversed theta pinch technique in which the plasma is heated to ignition temperatures by axial implosion, followed by adiabatic compression. The formation and axial implosion, principles have beeen demonstrated in experiments at Mathematical Sciences Northwest, Inc. as well as in the Soviet Union.

24953 **Tools and methods for the implementing the control system on the mirror fusion test facility.** Minor, E.G.; Labiak, W.G. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2043-2045(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Installation of the major hardware subsystems for MFTF is nearing completion. These subsystems include the Fusion Chamber System, the eight kV neutral Beam System, the Superconducting Magnet System, and the Personnel Safety System. The Local Controls group has undertaken a uniform approach to implementing the control systems for all the these hardware subsystems. The software and hardware tools which were developed to carry out bringing up subsystems contanining up to 900 separate channels of control and status are also described.

24954 **Lower hybrid rf monitoring system for PLT.** Martin, A.R. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2126-2128(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Lower hybrid power is coupled to PLT through six independent waveguides. Six amplifier klystrons generate a total of 1.2 MW of power at 800 MHz for this experiment. A common crystal controlled signal source drives solid sate low level amplifiers which are followed by power dividers to drive each klystron and to provide a coherent reference for making phase measurements at the monitor cabinet. Each of the six high power channels includes directional couplers for sampling the forward and reflected RF signals. This paper describes the monitor cabinet which procesess the RF samples and provides analog representations of power phase for use by the PLT data acqusition system.

24955 **Overview of INTOR nuclear systems.** Abdou, M.A. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 569-573(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A serious effort was devoted in the Phase-1 study for INTOR to identifying critical issues and developing credible design concepts for the nuclear systems. Erosion by charge-exchange neutrals and effects of plasma disruption are key issues for the first wall. A melt layer is predicted to develop in a bare stainless steel wall under plasma disruptions. Graphite tiles will not melt but they introduce serious uncertainties into the design. A partial tritium-producing blanket will be installed on INTOR to reduce the cost of externally supplied tritium. The key issue is the solid breeder blanket concept relates to the effect of radiation on tritium inventory in the blanket. The design strategy for the divertor collector plate focused on separating the surface and high heat flux problems and on utilizing a novel mechanical design concept for attaching tungsten tiles to a stainless steel (or copper) heat sink.

24956 **Conceptual design of tritium breeding blanket for INTOR.** Morgan, G.D.; Bowers, D.A.; Delaney, M.J.; Hartman, A.E.; Clemmer, R.G.; Abdou, M.A.; Finn, P.A.; Jung, J.; Misra, B.; Smith, D.L. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 732-735(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The paper describes the U.S. reference design for the tritium breeding blanket for INTOR. Details of the blanket conceptual mechanical design are presented, together with a discussion of thermal, structural, and mechanical aspects and the rationale for selection of key design features. The INTOR design was required to use a solid tritium breeding compound, Li/sub 2/SiO/sub 3/; a solid lead neutron multiplier; low temperature, low pressure water coolant; helium purge gas for tritium removal; and Type 316 austenitic stainless steel. A key feature of the U.S. design is the minimization of tritium inventory, obtained through the use of a graphite neutron moderator to reduce the required amount of breeder, and the use of

tailored gap conductance values to keep the breeder in the optimum temperature range for tritium release.

24957 **Neutronics analysis of graphite-moderated solid breeder blanket designs for INTOR.** Jung, J.; Abdou, M.A. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 736-739(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An in-depth analysis of the INTOR tritium production blanket design is presented. A ternary system of solid silicate breeder, lead neutron multiplier, and graphite moderator is explored primarily from safety and blanket tritium inventory considerations. Lithium-silicate (Li/sub 2/SiO/sub 3/) breeder systems are studied along with water (H/sub 2/O/D/sub 2/O) and Type 316 stainless steel as coolant and structural material, respectively. The analysis examines the neutronics effects on tritium production regarding: (1) coolant choice; (2) moderator choice; (3) moderator location; (4) multiplier thickness; (5) /sup 6/Li enrichment; and (6) /sup 6/Li burnup.

24958 **Liquid Li-Pb-Bi, a new tritium breeder.** Rogers, A.G.; Benedict, B.L.; Clemmer, R.G. (NC State Univ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1176-1178(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In light of their potential utility as tritium breeder blanket materials, a study was conducted to identify and characterize low-melting phases in the lithium-lead-bismuth system. It is found that a low-melting ternary phase field did in fact exist. In addition, the qualitative reactivity of Li-Bi-Pb alloys with water was tested, and although minimal evidence of exothermic chemical reaction was observed, a physical vapor explosion did occur in one of the tests.

24959 **Solid oxide compounds - properties necessary for fusion applications.** Finn, P.A.; Kurasawa, T.; Nasu, S.; Noda, T.; Takahashi, T.; Takeshita, H.; Tanifuji, T.; Watanabe, H. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1200-1204(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An experimental program was conducted in collaboration with the staff at the Japan Atomic Energy Research Institute for the purpose of generating fusion pertinent thermophysical and chemical data on two ternary lithium oxides that have potential as tritium breeder materials, Li/sub 2/ZrO/sub 3/ and Li/sub 2/TiO/sub 3/. The four areas studied were: (1) fabrication, (2) thermal diffusivity/thermal conductivity, (3) compatibility with candidate structural alloys (HT-9, 316 SS, and Ni-plated 316 SS), and (4) tritium release behavior after irradiation. Where possible, the behavior of these materials was compared with lithium oxide.

24960 **Towards strategy of reliable fusion first wall design.** Schultz, J.H. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1406-1409(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Fusion first walls are subject to a large number of possible failure mechanisms, including erosion due to sputtering, arching, blistering and vaporization and crack growth due to thermal and magnetic stresses. Each of these failure mechanisms is poorly characterized and has the potential of being severe. A strategy for designing reliably in the face of great uncertainty is discussed. Topological features beneficial to reactor availability are identified. The integration of limiter pumping with rf wave launching is discussed, as a means of simplifying reactor design. The concept of a 'sewer' limiter is introduced, as a possible long-life limiter topology. The concept of flexible armor is discussed, as a means of extending maximum life.

24961 **Key design issues in the definition of the fusion engineering device (FED) first wall and limiter features.** Fuller, G.M.; Haines, J.R.; Cramer, B.A.; Davisson, J.P. (McDonnell Douglas Astronaut Co, Oak Ridge, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1447-1450(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

First wall and limiter design activities for the FED have resulted in the identification of the importance of two major issues to the design. These issues are the specification of the .Plasma edge conditions .Nature of plasma disruptions. The resolution of these issues is essential for the development of a demonstration reactor. In this paper the effect of uncertainty in the above phenomena on the design and associated performance is discussed, and the associated design approach is described.

24962 **Mechanical configuration and shielding for FED fuel injectors and diagnostic instrumentation.** Gorker, G.E.; Engholm, B.A.; Nelson, W.D.; Murray, J.G. (GE, Oak Ridge, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1459-1462(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Fusion Engineering Device (FED fuel pellet injectors and some plasma diagnostic instrumentation requirements are based on machine performance and operating scenarios needed to perform tests or experiments. The pellet injector is needed to produce the desired plasma fueling condition and the diagnostic instrumentation is needed to measure the distribution of plasma parameters. Both the pellet injectors and the instrumentation identified in this paper require direct line of sight to the plasma and, therefore, substantial shielding and torus surface space. With the interface design described in this paper it is possible to use common structures and shielding to minimize both of these requirements and yet provide for independent remote maintenance.

24963 **Conceptual design and material consideration on toroidal CTR first wall.** Ma, B.N. (Iowa State Univ, Ames, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1617-1620(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An integrated, modular wedge-shaped first wall and blanket system for a toroidal D-T controlled thermonuclear reactor (CTR) is proposed which differs from various concepts of the first wall or first wall and blanket reference designs reported. The candidate materials are selected to meet the probable environment and the required properties of the integrated, modular first wall and blanket systems. The following important areas are analyzed: (1) neutronics and heavy particle bombaramet, (2) structural integrity, (3) heat transfer and corrosion resistance, and (4) energy generation and tritium breeding of the first wall and blanket material(s).

24964 **INTOR first wall erosion during plasma disruption.** Merrill, B.J. (EG and G, Idaho Falls, Idaho, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1621-1625(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A plasma disruption within a fusion device the size of INTOR can create extensive first wall surface ablation. This paper presents an overview of other INTOR Phase I Design Study ablation models, modeling discussions for the first wall, vaporized material, and melt/vapor interface, and the results of calculations performed for first wall materials of stainless steel, beryllium, and carbon.

24965 **Modular first wall concept for steady state operation.** Kotzlowski, H.E. (Max-Planck Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1626-1629(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

On the basis of the limiter design proposed for ZEPHYR a first wall concept has been developed which can also be used as a large area limiter, heat shield or beam pump. Its specific feature is the thermal contact of the wall armour elements with the water-cooled base plates. The combination of radiation and contact cooling, compared with radiation only, helps to lower the steady state temperatures of the first wall by approximately 50 % and to reduce the cooling-time between discharges. Particulary the lower wall temperature give a larger margin for additional heating of the wall by plasma disruption or neutral beams until excessive erosion or damage of the armour takes place.

24966 **Can wall and limiter erosion be eliminated in fusion reactors?.** Norem, J.H. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1630-1632(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Pump limiter designs, while generally simpler than magnetic diverters have two primarily problems: wall erosion and the resultant plasma impurity concentration. In principle, these problems can both be solved by artificially maintaining an impurity density of low-Z materials in the plasma edge region which should enable impurity deposition on the limiter and walls to exactly compensate erosion while at the same time producing negligible radiation loss from the plasma. In paper outlines a proposed method of in-situ maintenance of pump limiters for tokamak reactors, and describes how this system could be operated, perhap under steady-state conditions.

24967 **Self-sustaining erosion-resistant low z coatings for first wall and limiter applications I: theory.** Krauss, A.R.; Gruen, D.M.; DeWald, A.B. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1633-1636(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

It has been suggested that dilute alkali metal alloys at surfaces facing a Tokamak plasma might be used to provide a self-sustaining low Z alkali metal surface which would shield the structural component of the alloy from erosion. At the same time, the alkali metal overlayer could be expected to primarily sputter as secondary ions, which are returned to the wall and limiter without entering the plasma. In order to achieve this goal, a number of conditions which may by mutually exclusive must be met. Several of these conditions are analyzed limits of performance for dilute alloys of Li in A1 Si, and Cu.

24968 **Doublet III vessel wall protection for 7 MW neutral beam heated plasma operation.** McKelvey, T.E.; Johnson, E.R. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1650-1653(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Doublet III vessel wall protection has been upgraded for the adddition of neutral beam heating. The design of this protection system is described here in detail.

24969 **Initial progress in the first wall, blanket and shield engineering test program for magnetically confined fusion power reactors.** Herman, H.; Baker, C.C.; Maroni, V.A. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1759-1762(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The first wall/blanket/shield (FW/B/S) Engineering Test Program (ETP) progresses from the planning stage into implementation during July, 1981. the overall background and scope have been described in detail in earlier reports. The program, generic in nature, comprises four test Program Elements (TPE'S) the emphasis of which is on defining the performance parameters for the Fusion Engineering Device (FED) and the major fusion device to follow FED. These elements are discussed here.

24970 **FELIX: an experimental facility to study electromagnetic effects for first wall, blanket, and shield systems.** Praeg, W.F.; Turner, L.R.; Biggs, J.; Bywater, J.; Fuja, R.; Knott, M.; Lari, R.J.; McGhee, D.G.; Wehrle, R.B. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1763-1766(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

As part of the DOE First Wall/Blanket/Shield (FW/B/S) Engineering Test Program, Argonne National Laboratory (ANL) is carrying out an experimental program to study electromagnetic effects. Electromagnetic effect in a FW/B/S system include time delay of equilibrium field penetration to the plasma, forces and torques, eddy current heating, and electrical arcing. Such effects can arise in a fusion reactor from plasma disruption and normal and abnormal charge and discharge of the magnets. The facility will consist primarily of a solenoid magnet, a surrounding pulsed dipole magnet, and associated power supplies and support structure.

24971 **The FELIX experimental program and future upgrades.** Turner, L.R.; Praeg, W.F.; Lari, R.J.; Wehrle, R.B. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1767-1770(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

As part of the DOE First Wall/Blanket/Shield (FW/B/S) Engineering Test Program, Argonne National Laboratory FELIX (Fusion ELectromagnetic Induction EXperiment to study electromagnetic effects. T?he earliest test will select and verify appropriate eddy current simulation computer program (codes), followed by component concept tests, component model tests, and finally tests with prototypes. This paper describes the experimental and computer code plans and future upgrades for the FELIX facility.

24972 **Elmo Bumpy Torus-reactor first wall/blanket shield (FWBS) design.** Stones, P.B. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1790-1793(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The composite structural design of the first wall/blanket/shield is based on separate, but iteratively-coupled, nucleonics, thermohydraulics, vacuum, limiter and magnetics calculations. integration of these elements into a viable FWBS design incorporating requirements of optimized fabrication techniques, economically feasible cost and installation, and remote maintenance within scheduled downtime, are some of the considerations that the study, on which this paper is based, attempted to satisfy within the bounds of the conceptual nature of the undertaking.

24973 **Low tritium inventory, phase change blanket concept for magnetic fusion.** Willenberg, H.J.; Cassady, P.E.; Hertzberg, A. (Math Sci Northwest Inc, Bellevue, WA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1801-1804(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A magnetic fusion blanket/heat exchanger concept is described in which lithium-lead pellets are melted within a fluidized blanket surrounding the plasma chamber. The liquid lithium-lead is then allowed to fall in droplet form through a counter-flowing inert gas heat exchanger where the tritium is extracted from the droplets and the sensible and latent heat of the lithium-lead is transferred to the gas by direct contact. This concept sharply reduces the tritium holdup time compared with other breeding blanket while permitting efficient heat transport from a magnetic fusion blanket at moderate pressure and low pumping power.

24974 **Nuclear design of Heliotron fusion reactor blankets (II).** Nakashima, H.; Ohta, M.; Iiyoshi, A. (Kyushu Univ, Fukuoka, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1805-1808(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The important aspects of the nuclear design - (a) tritium breeding and (b) shielding of superconducting magnet - are investigated for the heliotron reactor by use of two-dimensional discrete-ordinates code to conduct for the actual geometric details. Emphasis has been laid in the present instance on locating the problems foreseen in the nuclear design rather than solving them.

24975 **Neutronic design for the TFTR lithium blanket module.** Cheng, E.T.; Engholm, B.A.; Su, S.D. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1818-1821(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The preliminary design of a lithium blanket module (LBM) to be installed and tested in the TFTR has been performed under subcontract to PPPL and EPRI. The objectives of the LBM program are calculation and measurement of neutron fluences and tritium production in a breeding blanket module using state of art techniques, comparison of calculations with measurements, and acquisition of operational experience with a fusion reactor blanket module. The neutronic design of the LBM is one of the key areas of this program in which the LBM composition and geometry are optimized and the boundary material effects on the tritium production in the blanket module are explored. The concept of employing sintered Li/sub 2/O pellets in tubes is proposed for the blanket design.

24976 **Preconceptual design of a packed fluidized bed blanket for a fission suppressed thorium-fueled CTHR.** Chi, J.W.H.; Karbowski, J.S.; Chapin, D.L. (Westinghouse Electr Corp, Pittsburgh, PA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1827-1830(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes a thorium-fueled PFB blanket concept for a Commercial Tokamak Hybrid Reactor. A preliminary mechanical concept is presented and the results of neutronics, thermal-hydraulics and economics analyses are discussed. Futher work needed to design and advance the concept is recommended.

24977 **TRACT reactor blanket study.** Wong, C.P.C.; Cheng, E.T.; Creedon, R.L.; Willenberg, H.J.; Zumdieck, J.F.; Hopkins, G.R.; Schultz, K.R. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1855-1858(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper presents the results of the blanket design of an EPRI-sponsored study for the TRACT reactor to investigate the technical feasibility of building a small fusion commerical power reactor based on the Triggered-Reconnection Compact Toroid (TRACT) confinement concept. Special attention has been given to design areas that are uniquely important to the TRACT reactor as a result of the high maximum neutron wall loading of 37.0 MW/m/sup 2/, the presence of the copper compression coil around the blanket and the requirement for an insulated first wall. The selected blanket, SiC first wall, a water-cooled Li/sub 17/Pb/sub 83b/lanket structure design that supports the cyclic magnet forces, and a PWR type power conversion system. Critical technology issues that are essential for the success of this blanket design are also identified.

24978 **Low activation blanket for the moving ring field-reversed mirror reactor.** Wong, C.P.C.; Cheng, E.T.; Creedon, L.; Hopkins, G.R.; Kessel, C.; Schultz, K.R. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1859-1862(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A low activation blanket for the Moving Ring Field-Reserved Mirror Reactor is presented. It uses SiC as the structural material which eliminates afterheat concerns and allows hands-on maintenance behind the blanket. The ceramic blanket design selected consists of a low pressure ceramic module containing Li/sub 2/O pressurized SiC tubes as the heat transfer element. These tubes penetrate the shield and tritium breeding blanket, and are connected at the back of the shield to a metallic coolant plenum. Ceramic blanket designed can be classified as a low-activation design and can possibly eliminate the problem of reactor afterheat, at the same time fulfilling all the blanket design goals of the MRFRM reactor study.

24979 **Radiation shielding issues on the FMIT.** Burke, R.J.; Davis, A.A.; Morford, R.J.; Huang, S.T. (Hanford Eng Dev Lab, Richland, WA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1916-1919(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Fusion Materials Irradiation Test Facility (FMIT) is being built to study neutron radiation effects in candidate fusion reactor materials. The FMIT will yield high fluence data in a fusion-like neutron radiation environment produced by the interaction of a 0.1A 35 MeV deutron beam with a flowing lithium target. The design of the facility as a whole is driven by a high availability requirement. The variety of radiaton evnironments is the facility requires the use of diverse and extensive shielding. Shielding design without the FMIT must accomodate the need for maintenance and operates access while providing adequate personnel and equipment protection.

24980 **Design of a lithium blanket module for testing in the TFTR.** Homeyer, W.G.; Creedon, R.L.; Yang, L.; Harker, Y. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1988-1991(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A Lithium Blanket Module (LBM) prototypical of a fusion reactor blanket is being designed by General Atomic for testing in the Tokamak Test Reactor (TFTR). Measurements of neutron fluence and tritium production in the module will be compared with the results of analyses to check on the neutronic methods and models to be used to design fusion reactor blankets and blanket modules for long-burn fusion reactors. The program will also provide operating experience in such areas as fabrication of breeding elements and blanket neutron dosimetry.

24981 **Helium-cooled, solid breeder blanket design for a tokamak fusion reactor.** Huggenberger, M.; Schultz, K.R. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1992-1995(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A preliminary design for a helium-cooled, solid breeder blanket for a tokamak fusion reactor has been developed and its performance looks quite good. The design is capable of bearing a 4MW/m/sup 2/ neutron wall load and the ideal pumping power required for the whole primary helium loop including the steam genrators is only 2/5% of the total thermal power. The integrated helium duct work results in a maximum overall thickness of only 86 cm. The design work was focused on the thermal-hydraulic aspects, which represent the key problems associated with using helium as a coolant. The present work demonstrates that the potential disadvantages helium has due to its limited heat transfer capabilities can be avoided or minimized by an appropriate thermal-hydraulic design.

24982 **Proceedings - 9th symposium on engineering problems of fusion research.** Choi, C.K. (ed.). (Univ of Ill, Urbana-Champaign, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2160(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This conference proceedings contains 576 papers, of which 37 appear in abstract form only. Technical coverage is very broad, and concerns topics on plasma engineering, diagnostics, superconductor developments, reactor design, laser applications, computer applications, and future reactor systems. Controls, instrumentation, and data handling were also reviewed at length. 547 papers have been separately abstracted.

24983 **Beginning steps toward fusion technology development.** Kintner, E.E. (US DOE, Washington, DC, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1-4(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The paper reviews the history of fusion technology development, starting from stellarator fusion reactor study led by Lyman Spitzer in 1954. Various fusion related programs initiated, such as: magnets; tritium processing and control; materials; plasma engineering; environment, health and safety; and reactor design and maintenance are discussed. The present status of the program is briefly described.

24984 **Mechanical design of a toroidal divertor for EBT-S.** Malick, F.S.; Brenner, W.C.; Chianese, R.B. (Westinghouse Electr Corp, Pittsburgh, PA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 76-79(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A novel toroidal magnetic divertor has been designed for the ORNL EBT-S steady state fusion device. The divertor replaces one of the cavities in the twenty-four coil and cavity toroidal array, with only minor modifications to the existing device.

24985 **TMX-axisymmetric magnet set design study.** Wong, R.L.; Chargin, A.K.; Logan, B.G. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 80-82(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Studies are being made to design an axisymmetric modification to the TMX-Upgrade experiment. The existing TMX-Upgrade quadrupole plug and transition magnet sets are replaced by the circular coils of an axisymmetric plug. The existing TMX-Upgrade magnet set is shown. The engineering of any axisymmetric magnet configuration involves the consideration of the points listed in Table.

24986 **Iterative numerical procedure for determining the shape of a constant tension 'D' magnet.** Chianese, R.B. (Westinghouse Electr Corp, Pittsburgh, PA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 83-86(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The difference between the magnetic fields of a uniformly wound toroid and a sectored toroid leads to somewhat different constant tension shapes. A simple numerical procedure is developed which determines the constant tension shape of a coil from the magnetic forces acting upon it. The method differs from previous techniques in its ability to use numerical field calculations as well as analytical field calculations. Numerical field calculations can be used directly without additional processing steps. The theory developed in this paper calculates the tension in the coil directly from the magnetic forces and refines the coil shape in an iterative fashion. Convergence is rapid and the results compare closely with previous published data. Sample calculations are presented for a pure constant tension shape and a supported constant tension shape.

24987 **Ripple reduction poloidal field coils for tokamak fusion reactors.** Bateman, G. (Ga Inst of Technol, Atlanta, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 87-90(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Ripple Reduction Poloidal Field (RRPF) coils consist of dipole magnetic coils placed above and below the plane of a tokamak plasma in order to produce the vertical and shaping field needed for plasma equilibrium and at the same time to reduce the magnetic ripple from discrete toroidal field (TF) coils. A design is presented which reduces the ripple produced by 8 TF coils with INTOR dimensions from more than 2% to less than 0.1% throughout the plasma. With this design, it is found that the poloidal field from the coils can be adjusted independent of the ripple reduction. Coil currents are found for which there are computed free-boundary plasma equilibria with elongated cross section.

24988 **Evaluation of the use of a normal shield to reduce transient field induced losses in tokamak superconducting coils.** Stekly, Z.J.J. (Magn Corp of Am, Waltham, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 103-106(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The ac losses in the conductor and structural eddy currents are a major cryogenic heat load in Tokamak toroidal superconducting field coils. This paper considers the use of a normal metal shield to reduce the conductor and structure power dissipation resulting from transient magnetic fields. Unless a room temperature shield is used, the power losses in the shield itself represent additional refrigeration capacity which must be taken into account. An analysis was carried out which allowed the power dissipation in the shield to be calculated as a function of shield time constant. It is shown that there is no gain in refrigeration power unless the shield time constant is greater that a certain minimum value. Typical results are presented.

24989 **Magnet system for a thermal barrier Tandem Mirror Reactor.** Kim, N.S.; Conn, R.W. (Univ of Calif, Los Angeles, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 107-110(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The magnet system for a thermal barrier D-D tandem mirror reactor has been studied as part of the UCLA tandem mirror reactor design study SATYR. Three main considerations in designing the SATYR magnet system are to obtain the desired field strength variation throughout the system, to have proper space for plasma and neutron shielding, and to satisfy the MHD stability to achieve maximum central cell /beta/. Due to the importance and the complexity, the 'internal' field reversal magnet is the main concern in the entire magnet system for SATYR. Two different magnet designs, a non-uniform current density solenoid and a higher-order solenoid, are discussed. Coil levitation for the internal field reversal magnet has been analyzed.

24990 **Eddy current load estimation for toroidal shells as a result of plasma disruptions.** Thome, R.J.; Pillsbury, R.D. Jr.; Langton, W.G. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 111-114(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A method is presented for estimating the eddy current induced Lorentz loading on a toroidal shell at $t = 0+$dueto a plasma disruption at $t = 0$. The method assumes that the shell is axisymmetric and has a circular cross-section. The method is applied to a particular tokamak geometry and compared with results obtained using a transient finite element program.

24991 **Model of toroidal magnet systems as orthotropic shells of finite thickness.** Bobrov, E.S.; Schultz, J.H. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 115-118(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A method for analyzing the stresses in toroidal shells of revolution, acted upon by arbitrary force fields, is described. The equations of Reisnner for orthotropic, axisymmetric shells of revolution are derived and solved for finite-thickness toroidal shells. As a design tool for the shape optimization of fusion magnets, such as the in-plane load support systems of toakamaks or bumpy tori, the analytical technique is a major extension of the work of W.H. Gray et al, which solved the stress equation for bending free toroidal shell shapes, subjected to a Lorentz force. The work described below is simultaneously an extension of the theory of shells and an alteration of the perceived 'optimal' shape for tokamak toroidal field magnets.

24992 **Calculation of transient current response of a set of coupled circuits using an eigenvalue technique.** Kalsi, S.S. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 119-122(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The usefulness of a closed form solution obtained by application of an eigenvalue solution method has been demonstrated. These closed form solutions are helpful in identifying peak values of currents, fields, and forces as a function of time. Use of this technique is recommended as much as possible in designing of hardware for tokamaks and other devices.

24993 **Pf coil current sheets for circular section tori to produce specified internal fields.** Thome, R.J.; Langton, W.G.; Pillsbury, R.D. Jr. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 123-126(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Abstract method is presented for determining the distribution of current required to produce any desired magnetic field distribution inside a circular section torus. The field must satisfy Maxwell's equations. The method assumes axisymmetry of the geometry and current distribution. The method for a zero net current flow in the cross-section is presented first. The modifications necessary to impose a nonzero net current are then given. Finally, illustrative examples are presented.

24994 **Analysis of external hybrid poloidal coil system.** Hamada, Y.; Abe, Y.; Kitagawa, S.; Toi, K. (Nagoya Univ, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 127-130(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Analysis of feedback control characteristics in the hybrid poloidal coil system (hybrid of the ohmic and the equilibrium vertical coils) is performed. It is found that, in the complex hybrid poloidal coil system, the plasma can be sufficiently well controlled using very simple equations for the calculation of feedback voltage.

24995 **Generation of multipole nulls in a tokamak geometry.** Kalnavarns, J. (MPB Technol Inc, Ste.-Anne-de-Bellevue, Que, Can). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 135-138(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

For a prescribed location of a poloidal-magnetic-field null on the mid-lane of a coil system in a toroidal geometry, the locus of allowable coil positions and the corresponding currents are calculated analytically. The topology and configurations associated with two coil pairs are examined to give constraints governing the generation of quadrupole, hexapole, and octupole nulls.

24996 **Optimisation of the poloidal field coil system in pulsed tokamaks.** Spears, W.R. (EURATOM, Abingdon, Oxfs, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 146-149(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Reactor studies show that the poloidal field coil system contributes significantly to the overall cost of air-cored pulsed tokamak reactors. Various design options are therefore examined here to provided a basis for optimization. The results show the importance of plasma D-shape, indicate the penalties incurred with discrete coil systems and imply that structural support requirements may be reduced at a cost in increased pulsed fields in the toroidal field coil.

24997 **Normal conducting steady-state toroidal magnet systems for large tokamaks.** Borrass, K.; Soel, M. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 150-153(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Normal conducting steady-state toroidal magnet systems are investigated, emphasis being placed on applications to large ignited tokamaks. The study is based on water-cooled, tape-wound D-coils. The data for the TF magnet systems are calculated in a self-consistent manner with a computer program including the plasma, shield, ohmic heating coil system and geometric requirements for blanket modules, beam ducts etc. An optimization procedure is used to find those TF coil systems which minimize cost-relevant quantities. The results are discussed.

24998 **Eddy current calculations for the tokamak fusion reactor through fields harmonics content.** Denno, K. (NJ Inst of Technol, Newark, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 158-161(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Another Tokamak of analysis regarding eddy current losses within the single Tokamak TFTR at Princeton and the multi-stage EBT at ORNL is presented. In this work comprehensive calculations for eddy current losses in terms of time-varying harmonic content for all the reactor magnetic fields coils system, are established.

24999 **Nonlinear stress analysis of the poloidal field coil for JT-60 tokamak machine.** Miyata, H.; Kojima, H.; Kimoto, H.; Takizawa, T.; Furuyama, M.; Ando, T.; Masuda, M.; Ohkubo, M.; Ohta, M. (Hitachi Ltd, Ibaraka, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 170-173(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The poloidal field coil (PFC) of the JT-60 is a very large scale coil. the coil conductors may be used at high stress level much different from that of usual conductors. In this paper, stress and strain behaviors in the conductor, accompanied by bending work of the PFC and cyclic loading of electromagnetic forces during operation are analyzed using elastic-plastic, large displacement finite element analysis. On the basis of the analytical results, the PFC fatigue strength is evaluated. this enables designing of the PFC with high strength reliability.

25000 **Fatigue design of the poloidal field coil for JT-60 tokamak machine.** Miyata, H.; Kimoto, H.; Kojima, H.; Takizawa, T.; Furuyama, M.; Ohkubo, M.; Ando, T.; Masuda, M.; Ohta, M. (Hitachi Ltd, Ibaraki, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 174-177(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

It is necessary for designing the poloidal field coil (PFC) to make confirmation on the reliability of the PFC against its operating loads. This paper deals with the strength analysis and the experimental studies to improve and evaluate the strength for welded

joint. Strength for softened part of welded zone will be improved by pre-work hardening technique which is performed at low temperature of liquid nitrogen. The strength improvement technique is examined and developed for welded zone, and the effect of preworking on the fatigue strength of coil is estimated by experiments. Besides, fatigue crack propagation life is examined on defects in weldment by using the method of fracture mechanics.

25001 **Load tests of a large coil.** Ohkubo, M.; Masuda, M.; Ando, T.; Kawamoto, N.; Nishio, T.; Takizawa, T.; Shizuoka, Y.; Sasajima, H. (Jpn At Energy Res Inst). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 178-181(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

JT-60 is a large Tokamak machine for the investigation of reactor grade plasma. The poloidal magnetic field coil which generates a poloidal magnetic field in a Tokamak is usually operated in a high mechanical stress and a high electrical voltage. Besides, the coil is excited repeatedly with large pulse currents. In order to confirm the reliability of the coil and the validity of the analytical method, the simulated electromagnetic and thermal load tests were performed. Finally, the destructive test was carried out to evaluate the maximum strength of the coil.

25002 **On mechanical stresses in solenoids constructed of transversely isotropic materials.** Gray, W.H.; Cain, W.D. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 182-184(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Equations relating the mechanical stress, strain, and displacement of elastic, axisymmetric solenoid magnets to the solenoid's geometry, current density, magnetic field, and material properties have been derived by several authors. For the special case of rotational transverse isotropy, these equations are singular for certain values of the ratio of the orthotropic elastic moduli. This paper discusses the mathematical conditions for which a singularity of this type exists and presents a general solution to these equations at their singular points.

25003 **Bitter-type magnet plate design with compound conductor of ultrahigh mechanical strength.** Haubenberger, W.D. (Max-Planck-Inst fuer Plasamaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 189-192(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A Bitter-type magnet plate design based on a compound conductor of ultrahigh mechanical strength is described. An explosion-bonded and cold-worked copper-austenite compound is jointed by a special procedure with a soft compound sheet.

25004 **Development of tf coil support concepts by design methodology in the case of a Bitter-type magnet.** Brossmann, U.B. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 193-196(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The application of the methodological design is demonstrated for the development of support concepts in the case of a Bitter-type magnet designed for a compact tokamak experiment@ aiming at ignition of a DT plasma. With this methodology all boundary conditions and design criteria are more easily satisfied in a technical and economical way.

25005 **Structural behavior of the Bitter plate tf magnet for the Zephyr ignition test reactor.** Bobrov, E.S.; Becker, H. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 199-202(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper discusses methods and results of the computer structural analysis of the Bitter plate toroidal field magnet design for the ZEPHYR Ignition Test Reactor. The magnet provides a field of 7.06 T at the center of the bore which is 1.76 m from the major toroidal axis. The ignited plasma is located at a major radius of 1.36 m where the magnetic field is 9.11 T. The plasma is moved to this final position following compression in the major radius. The horizontal bore of the magnet is 1.8 m.

25006 **Missile generation due to electrical arcing in high field fusion magnets.** Schneider, H.; Caretta, A. (Comm of the Eur Communities, Ispra, Italy). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 203-206(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Large amounts of energy (10 /sup 10/-10/sup 11/ J) are stored in the magnetic field of superconducting magnet systems used in conceptual fusion-reactor designs. If only part of this energy is released accidentally, damage to the magnet and to other rector subsystems may result. In fusion-reactor environments it may lead to the evaporation of activated material and to the generation of energetic missiles, involving interference with sources of radioaactive material in the plant. Results from a Runge-Kutta routine have been obtained for FINTOR, a minimum size Tokamak DT experimental reactor, indicating that missiles of about 20 kg weight may reach velocities in the order of 100 m/s.

25007 **Electrical insulation qualification tests for TFTR TF and PF coils.** Johnson, H.G.; Alton, R.J. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 208-211(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper summarizes the electrical insulation tests required for in-process and final manufacture acceptance of the TF and PF magnetic field coils. The testing equipment and general test procedures used by the various coil manufacturers are described. The results of dc and ac high potential, corona (partial discharges), dielectric loss and impulse tests of the coils manufactured to date are summarized.

25008 **Selection and application of C18200 chrome copper for the OHTE confinement test helical coil.** Puhn, F.A.; Graumann, D.W. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 213-215(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The selection and qualification of copper for the OHTE confinement test helical coil (H-coil) was a crucial step in the success of this new experiment. Previous problems encountered at General Atomic Company with close tolerance machined parts made from high strength copper were identified. The design criteria included selecting a material with minimal warpage during machining, an electrical conductivity >80% IACS, and a yield strength of at least 241 Mpa (35 ksi). The investigation of candidate materials and testing samples led to selection of a material that fully met all requirements. The C18200 chrome copper forged plates were supplied by the Ampco Metal Division of Ampco-Pittsburgh Corporation.

25009 **Cryogenic voltage withstand and heat transfer tests for the General Electric large coil turn heaters.** Schwenterly, S.W.; Fitzpatrick, C.M.; Court, W.R. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 260-264(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In order to assess the stability of the various Large Coil Program concepts, each of the three U.S.-made coils incorporates heaters to create a normal zone in the conductor. Based on results of finite-element heat transfer calculations, voltages in the neighborhood of 1 kV are needed to supply the required power over a half-turn. By comparing the results with room-temperature tests on the same or similar samples, a room-temperature production hi-pot test can be specified which gives confidence that the heaters will per-

form properly at low temperature but which is not severe enough to damage them. By measuring the conductor temperature during a heater pulse, the validity of the heat transfer calculations can also be checked.

25010 **Two-phase helium-IV quench analysis for superconducting magnets.** Byington, G.A.; Shipley, W.D.; Ryan, T.L. (Union Carbide Corp, Oak Ridge, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 273-276(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The sizing of a coil venting system to ensure that the coil cavity design pressure is not exceeded during a quench is a critical part of any superconducting coil design. This paper describes the calculations performed by this computer program to analyze the two-phase venting of the helium coolant during a superconducting coil quench. The coils being analyzed are a pool boiling, superconducting magnet for the Large Coil Program.

25011 **Pool boiling helium heat transfer from two large monolithic copper stabilizers.** Peck, S.D.; Christensen, E.H. (Gen Dyn, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 277-280(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The heat transfer performance of two large, monolith, pool-boiling conductors designed for 12 Tesla service in Tokamak field coils has been measured in simulated vertical-axis conductor packs. The surface heat flux of a shallow, rectangular-grooved conductor was 15% lower than that of a simple rectangular conductor in temperature regimes of cryostability interest. However, the wetted surface area enhancement provides overall heat transfer for the grooved surface of about 2.1 times that of the flat surface. The data for the conductors away from the magnet wall agrees closely with design analysis predictions for both conductors and verifies their predicted cryostability performance. Effects on cryostability performance of two insulation systems made by molding processes and incorporated with these two conductors have also been determined.

25012 **EBTR magnet design.** Lieurance, D.W.; Bathke, C.G. (Gen Dyn, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 281-284(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Engineering design proposed for the aspect-ratio-enhanced Elmo Bumpy Torus Reactor (EBTR) is presented. After a summary of the constraints and design philosophy that have directed this task, a general description of the EBTR magnet system is given. That is followed by a substem-by-subsystem description of the toroidal field/aspect ratio enhancement coil set and its supporting electrical system.

25013 **Finite element analyses and instrumentation layout for the superconducting test facility TOSKA.** Zehlein, H.; Dolensky, B.; Krauth, H.; Messemer, G.; Ulbricht, A. (Kernforschungsvent Karlsruhe, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 293-296(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes the layout of the instrumentation for the superconducting test facility 'TOSKA' based on the results of a finite element modelling of the EURATOM coil for the IEA Large Coil Task. Three types of data are of interest: deformation, material properties and mechanical interaction between coil components. Particular aspects of coil support and possible constraints against undesired deformation are discussed in some detail. Sensor properties and locations are explained.

25014 **Superconducting ohmic heating solenoid concept for ISX-C.** Shen, S.S.; Brown, R.L.; Gray, W.H.; Lubell, M.S. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 297-300(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The employment of a superconducting ohmic heating solenoid is presented for ISX-C based on currently available superconducting technology. The magnet is designed to be cryostable and to generate the required flux swing of 4.5 V/s while simultaneously meeting the limitations imposed by available space and structural interfacing to the torroidal coils. A novel spliceless pancake winding scheme is proposed which offers excellent cooling and completely supports the cable conductor throughout the winding.

25015 **Safety implications of shorted turns in superconducting magnets for fusion.** Turner, L.R. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 301-304(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A Computer Code SHORTURN has been developed to analyze the thermal and electrical behavior of a shorted turn of a cryostable superconducting magnet when the magnet is discharged. The code, a modification of the code TASS, performs the thermal analysis of a heat balance using the back-difference method, and the electrical analysis semi-analytically. An LCP TF coil and the OH solenoids of FED and INTOR have been analyzed; the peak temperature and peak current are given as functions of short resistance and coil discharge time.

25016 **Acoustic emission triangulation of mechanical disturbances in superconducting magnets.** Tsukamoto, O.; Steinhoff, M.F.; Iwasa, Y. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 309-312(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An acoustic emission (AE) technique is being developed to locate sources of mechanical disturbances, particularly of conductor motion, in superconducting magnets. This paper presents preliminary results from two large magnets: (1) a high-current density dipole for high-current density dipole for high-energy physics application and (2) a 'stable' saddle magnet for MHD application.

25017 **Comparison between experimental and analytical winding prestrain for a circular solenoid.** Gray, W.H.; McManamy, T.J.; Ballou, J.K.; Brown, R.L. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 316-319(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A series of practice winding experiments were done during the winding of the development magnets for ELMO Bumpy Torus Proof-of-Principle (EBT-P - a large, experimental fusion device using 36 superconducting mirror magnets). The experimental method involved layer winding conductor on the bobbin and monitoring the hoop strain accumulation on the inside of the bobbin's bore tube and thus inferring the effectiveness of winding tension as a means of controlling operational stress levels within the magnets. The experiments were done with bare conductor and with several types of spiral wrapped insulation on the conductor. Good agreement between experimental data and a computational stress model was obtained. The effect of time-dependent viscoelastic material behavior was observed.

25018 **Coil performance test of nb/sub 3/sn conductor to be used in the advanced cluster test facility.** Ando, T.; Takahashi, Y.; Nishi, M. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 320-323(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

One double-pancake test coil has been constructed and tested to study the performance of stabilized multifilamentary Nb/sub 3/Sn conductor to be used in the cluster test back-up coils (CBC). This double pancake has an inner diameter of 40 cm and an outer diameter of 84 cm. According to present plans, a CBC will be at-

tached to each of the present cluster test coils in the cluster test facility in order to increase the background field at Test Module Coil II. A stability test was carried out using attached heaters. The experimental results can be explained by the heat condition equation, after taking into consideration the heat transfer from neighbouring conductors.

25019 **Manufacture of 16,000 amp superconducting conductor for the tokamak toroidal field coil program.** Hamilton, W.C.; Carr, S.L.; Declercq, J.G.; Lincoln, R.W.; Pollock, D.A.; Zeitlin, B.A. (Intermagn Gen Corp, Guilderland, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 324-327(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Intermagnetics General Corporation recently completed a 3-year contract to manufacture 7,340 meters of superconducting conductor to be used in the General Electric Large Coil, one of six superconducting toroidal field test coils for experiments to support magnetic fusion research which will be performed at the Oak Ridge National Laboratory. This paper describes the special manufacturing techniques developed to form the superconducting wire into a square cross section, tin it with solder, and then solder it into the 'U'-shaped copper stabilizer. The soldering equipment and techniques developed to bond the subelement to the core are also discussed.

25020 **Origin of resistive voltage and the related problems in large-capacity Nb_3Sn conductor.** Furuto, Y.; Tanaka, Y.; Meguro, S.; Suzuki, T.; Inoue, I. (Furukawa Electr Co, Tokyo, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 330-334(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper deals with the systematic analyses and considerations on various types of voltage-current characteristics in large-capacity Nb_3Sn superconductors--typically of a few thousands amperes and of cross-sectional area of several tens squared milimeters. The fundamental conclusions are summarized for three cases as follows: For the first case in which current-transfer effect is dominant, in order to determine the critical current, deceptive voltage originating from the current-transfer across the matrix metals must be excluded before applying usual definition such as effective resistivity of 10^{-13} /OMEGA/For the second case in which cracking or some fracture occurs in the superconductor, conventional definition of critical current can be reasonably applied because other effects are covered with fracture-induced large voltage. For the third case, ordinary one, in which current-transfer and strain effects exist simultaneously, the same procedure as the first one should be applied. The degradation of critical current due to strain effect can be evaluated by this method.

25021 **Description of the molding system for the epoxy impregnation of the TFTR poloidal field coils.** McDade, J.C.; Dudek, L.E. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 335-338(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TFTR Poloidal Field (PF) Coils are a system of coils located outside the Toroidal Field Coils. They provide both ohmic heating and magnetic fields for positioning the plasma. This paper describes the method used to epoxy impregnate the large PF coils. The stack is now ready to be impregnated. The TFTR specification calls for the coils to be impregnated with epoxy under vacuum and then pressurized until the epoxy resin is cured.

25022 **Design characteristics of the TFTR sector module (I).** Stern, E.; Carguilia, G.; Spinos, F.; Sabado, M.M. (Grumman Aerosp Corp, Bethpage, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 342-345(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Tokamak Fusion Test Reactor (TFTR) employs a modular concept to assemble the machine's major components. A Sector Module is defined as a subsection of the Vacuum Vessel/Toroidal Field (TF) Coil Assembly consisting of a one-tenth segment of the vacuum vessel, two TF coils and four shear/compression panels (SCPs). It is not the intent of this paper to present the aspects of each component of the Sector Module but to focus primarily on the TF coils and SCP's. The paper addresses the design to tolerancing, machining, and assembly/installation of these components to achieve the proper load sharing within the Sector Module concept.

25023 **Development of TFTR sector module assembly procedures (II).** Stern, E.; Carguila, G.; Spinos, F.; Sabado, M.M. (Grumman Aerosp Corp, Bethpage, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 346-349(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Tokamak Fusion Test Reactor (TFTR) employs a modular concept in the design and assembly of the machine's major components. A Sector Module consists of a vacuum vessel segment, two torroidal field coils with their stainless steel cases, four shear compression panels (SCP's) and two pedestal assemblies. Although not a part of the Sector Module, the Inner Support Structure (ISS) or bucking cyclinder, is an important element in the load reaction scheme of the module and plays a major role in the development of installation concepts. Only the TF coil, SCP and ISS installation are discussed in this paper.

25024 **Thermal design considerations of shields for levitated coils.** Grotz, S.P. (Univ of Calif, Los Angeles, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 354-357(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Thermal response analysis of shields for levitated coils has been conducted. Minimizing the rate of temperature increase in the superconductor was the primary concern. Initial analysis of a reference case has shown that, with constant thermal properties, the superconductor temperature remains below 12 Kelvin for approximately 45 days. Thermal degradation of the super insulation occurs after only approximately 5 days resulting in faster thermal response of the superconductor. Parametric analysis such as addition of a heat sink and larger high temperature insulation zones has been investigated with regards to limiting super insulation degradation and superconductor temperature increases. The final shield design can operate for approximately 2 weeks with a thermal recycle time (cool down) of 1/2 to 1 day.

25025 **Enhanced cooling with helium channels in the TF coil casing for FED.** Srivastava, V.C. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 358-361(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The toroidal field (TF) coil casing in a tokamak is subjected to high nuclear heating along the vertical straight leg of the TF coil and locally high eddy current heating in the vicinity of the D-shaping poloidal field (PF) coils. Liquid helium channels are incorporated in the TF coil casing to intercept these local heat loads before they are transmitted to the winding and jeopardize the winding stability. The proposed cooling channels for FED operate at 4 K in the coil case and at 20 K in the intercoil support structure. The refrigerator capacity is reduced significantly by removing the intercoil support structure losses at higher temperatures. The performance and design of these cooling channels for FED TF coils are discussed in this paper.

25026 **TEXT poloidal field power systems operation.** Nelin, K.; Hutchins, H.S.; Kellogg, J.C. (Univ of Tex, Austin, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 362-365(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Texas Experimental Tokamak (TEXT) has been operational since November of 1980. It has been running consistently since August 1981 with a 300 kA plasma current flat top. Plasma parameters from a typical shot are shown. Start-up and operation of the machine is described in a separate paper. All units are now on line and operating within design parameters. Initial testing and changes necessary to assure specified performance is described. Discharge cleaning is employed in order to minimize vacuum system contamination. The optimized characteristics of this process are described.

25027 **TEXT toroidal field power supply operation.** Brower, D.; Harris, H.W.; Nelin, K.; Hutchins, H.S.; Wildi, P.; Cox, J.; Ross, H.P. (Univ of Tex, Austin, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 366-369(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes the circuit modifications and operating experience encountered during power up tests and acceptance of the thyristor controlled power supply for the toroidal field coils of the Texas Experimental Tokamak (TEXT) which is now in full operation at the Fusion Research Center of the University of Texas at Austin.

25028 **Installation and operation of the motor-generator for the TEXT.** Wildi, P.; Brower, D.; Harris, H.W.; Elliott, L.C. (Univ of Tex, Austin, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 370-373(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes the general features, installation and operation of the 185 MJ (stored energy) motor generator to provide pulsed power for the Texas Experimental Tokamak (TEXT) at the Fusion Research Center of The University of Texas at Austin. The motor generator will deliver a pulse of four seconds duration every two minutes at a peak power of 100 MVA and 6.9 kV to operate the toroidal field and ohmic heating power supplies. Machine output characteristics are compared with design characteristics. The performance of the machine on the power system which has limited power capability is described as well as modifications made to avoid overpowering the system. The motor-generator has been in service since April 1980 and the performance with the toroidal field and OH poloidal power system is described.

25029 **Magnetizing circuit of TEXTOR.** Braunsberger, U.; Lochter, M.; Weigand, W. (Tech Univ, Braunschweig, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 411-415(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The magnetizing circuit is that part of the Tokamak TEXTOR which biases the iron core of the ohmic heating transformer and generates the loop voltage for plasma breakdown. In this paper the various operational modes of the TEXTOR magnetizing circuit are explained, the components are described, and results from a test program are given.

25030 **Energy dump concept for large energy storage coils.** Eyssa, Y.M.; McIntosh, G.E.; Hilal, M.A.; Khalil, A.; Nilsson, B. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 456-459(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A scheme to internally dump all the energy stored in a large superconducting energy storage coil in an emergency situation is described. The magnet is a 1000 MWh single layer solenoid cooled by superfluid helium. The dump concept involves dumping the helium into a cooled reservoir, shorting all the turns and the cold structure, and triggering the first few top turns normal by means of an attached heater. This concept insures a uniform final temperature in the winding and the structure. The voltage distribution across the coil during the dump time is also discussed.

25031 **Analysis of field error criteria in an EBT reactor.** Uckan, N.A.; Swain, D.W.; Lee, D.K.; Uckan, T.; Owen, L.W.; Gordinier, M.R. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 467-470(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A closed field line device, such as an ELMO Bumpy Torus (EBT), is very sensitive to small perturbations in the magnetic field. The estimates of the maximum tolerable field errors (/delta/B/B) for an EBT reactor are derived. Numerical calculations of field errors due to single coil misalignments indicate that the field line closure is most sensitive to angular misalignment of the coils. Statistical analysis of errors from N coils, assuming the errors in all N coil alignments are randomly distributed in a Gaussian fashion, is found to be in reasonable agreement with the numerical calculations.

25032 **Status of the magnet systems and highlight of the main assembly problems.** Salpietro, E.; Huguet, M.; Last, J.R.; Pohlchen, R. (JET Jt Undertaking, Abingdon, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 519-522(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The JET magnetic system has been already described is several other reports. In this report only a concise description of the components and its construction is discussed. It also highlights the major assembly problems envisaged at this moment for the assembly of the JET device. The three main components of the magnetic system discussed here are: poloidal field system, toroidal field system and mechanical structure.

25033 **Engineering feasibility challenges for the magnet community.** Montgomery, D.B. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 523-527(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The magnetic Fusion Energy Program will enter a period of renewed activity during the next decade. It must face the dual challenges associated with a major new emphasis of Fusion Engineering on the one hand, and on the other, a renewed exploration of emerging advanced toroidal and mirror concepts most suitable for future reactors. This program presents particular challenges for the magnet community, and is the focus of this review.

25034 **Engineering design and construction of the S-1 spheromak coil systems.** Heitzenroeder, P.J.; Helmich, R.C.; Pereira, M.A.; Loesser, G.D. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 535-538(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Spheromak coil systems consist of a torus-shaped flux core of 1 m. major radius located within the vacuum vessel, and three pairs of euqilibrium field (EF) coils located outside the vessel. The engineering design and fabrication methods of these coil systems are the topics of this pper. Toroidal and poloidal currents are induced by the PF (poloidal field) and TF (toroidal field) windings, located in the flux core. The windings are made of water-cooled copper cables located in grooves in and around a G-10 epoxy-glass torus form.

25035 **Structural design procedures for FED magnets.** Hooper, R.J.; Hunter, B.L. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 539-542(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Structural design criteria developed for toroidal and poloidal field coils in the Fusion Engineering Device (FED) are discussed; also considered ar e the structural consequences of operating the coils for a portion of their design life at elevated field levels. The structural design procedure incorporates primary stress limits to provide a margin against large-scale yielding or rupture due to

gross overloading. In addition, the growth of a flaw in the structural material (due to pulsed loading), followed by fracture, is considered. The structural design procedure requires that both stress limits be satisfied.

25036 **Pool boiling superconducting coils for the Large Coil Task.** Luton, J.N. Jr.; Kruse, G.S.; Linkinhoker, C.L.; Shimamoto, S. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 547-551(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The United States and three other members of the International Energy Agency have entered into an agreement for the fabrication of 2 1/2 x 3 1/2-m bore model superconducting coils and their testing in the Large Coil Test Facility under construction at the Oak Ridge National Laboratory. The six coils, three produced in the U.S. and three in other countries, are to be tested together in a compact torus, and are supposed to meet the same performance criteria. However, they are designed differently, with the expectation that several designs will be proven suitable for producing DC confinement fields for tokamak fusion reactors. The first three coils to be completed will employ NbTi conductor cooled by baths of boiling helium. This paper gives an overview and comparison of these three designs, describes some of the verification testing and the incorporation of the results into the designs, discusses some of the unexpected fabrication difficulties and their resolutions, gives the fabrication status as of October 1981, and refers to the literature describing the coil efforts in greater detail.

25037 **International tokamak reactor conceptual design overview.** Stacey, W.M. Jr. (GA Inst of Technol, Atlanta, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 556-559(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The International Tokamak Reactor (INTOR) Workshop is an unique collaborative effort among Euratom, Japan, the USA and USSR. The Zero-Phase of the INTOR Workshop, which was conducted during 1979, assessed the technical data base that would support the construction of the next major device in the tokamak program to operate in the early 1990s and defined the objectives and characteristics of this device. The INTOR workshop was extended into phase-1, the Definition Phase, in early 1980. The objective of the Phase-1 Workshop was to develop a conceptual design of the INTOR experiment. The purpose of this paper is to give an overview of the work of the Phase-1 INTOR Workshop (January 1980-June 1981, with emphasis upon the conceptual design.

25038 **INTOR physics.** Schmidt, J.A. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 564-568(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The overall INTOR size and magnetic field parameters have been established as part of the INTOR transport modelling program. These studies, based on the presently accepted transport coefficients, have established the INTOR ignition margin and overall INTOR performance. Divertor modelling studies have focused on the performance of the INTOR poloidal field divertor. These studies have shown that the neutrals are confined to the divertor channel, thereby limiting the charge exchange erosion of the first wall. The strong cooling produced by the neutrals reduces the ion temperature in the divertor. The impurities eroded from the divertor plate have a low probability of entering the main discharge.

25039 **Magnet design for INTOR.** Hunter, B.L. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 582-585(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The INTOR Phase 1 Design Study was concluded in June 1981, with a technical review of and concurrence with the final draft of the INTOR conceptual design report by the four INTOR Program delegations - EURATOM, Japan, U.S.A., and the U.S.S.R. The conceptual design report will be edited and publiched in the fall of 1981 by the IAEA in Vienna. This paper describes the magnetic systems - toroidal field and poloidal field - for the INTOR conceptual design.

25040 **Lorenz force induced strand motion in a superconducting cable.** Maeda, H.; Maguire, J.F.; Tsukamoto, O.; Maguire, J.F.; Tsukamoto, O.; Tamada, N.; Iwasa, Y. (Toshiba Corp, Kawasaki, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 623-626(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Lorentz force induced strand motion in a superconducting cable was investigated by a combined technique of voltage and acoustic emission measurements. Both types of motion, elastic (non-dissipative) and dissipative, were observed. Energy released in the dissipative motion is estimated.

25041 **Studies on stability and a.c. losses of filamentary conductors for fast ramp rate ohmic heating coils.** Ogasawara, T.; Kubota, Y.; Makiura, T.; Akihama, R.; Yasukochi, K. (Nihon Univ, Tokyo, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 627-630(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The ohmic heating coils in a typical design of tokamak fusion reactors are needed to provide time varying field with a maximum of about 7T and a field ramp rate of 10 T/sec. The purpose of this work is to investigate a.c. losses and stability of NbTi multifilamentary composite conductors when they are carrying transport currents and exposed to rapidly rising fields: The maximum of field ramp rate was about 200 T/sec.

25042 **Persistent resistive regions and cryogenic stability of composite conductors: effect of cooling spacers.** Hilal, M.A. (Mich Technol Univ, Houghton, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 631-634(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Conductors cooled by liquid helium are either placed in grooves or separated by spacers and heat generated in the conductors is removed by the adjacent liquid helium channels. In the absence of cooling spacers stable temperature distribution exist only if the equal area criteria is satisfied. In the presence of spacers, many steady state temperature distributions are possible and persistent resistive regions can exist along the conductor. It is shown in a previous study that persistent resistive regions can also exist due to conductor delamination. The similarity between the two cases can be seen if the conductor is considered as a composite delaminated from zero cross sectional area stabilizer. The effect of spacers on current recovery was also studied by Meuris et al and Seyfert. et al Approximate analysis based on a simple model are discussed in detail in this paper. Sample results and brief discussion of more general model are also presented. Details of the general model will be published elswhere.

25043 **Development of superconducting poloidal field coils for tokamak reactors.** Kim, S.H. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 635-639(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Poloidal field (PF) coils in tokamaks are required to induce and initially heat the plasma as well as to stabilize it in an equilibrium position. The primary need for superconducting PF coils of subdivided high currents cable is to minimize the charging and discharging voltages and to reduce the ac losses during pulsing cycles. In this paper, pulsed coils developed or under development are briefly described to realize that the present effort is insufficient for the design of near future tokamak reactors.

25044 **Design of a superconducting 20 MJ induction coil.** Singh, S.K.; Jarabak, A.J.; Ibrahim, E.A.; Davis, J.B.; Gaberson, P.C.; Rogers, J.D.; Thullen, P.; Walker, M.S. (Westinghouse Electr Corp, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 644-647(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper presents the results of the detailed design and analyses of the 20 MJ superconducting induction heating coil. The coil is designed to store 20 MJ at 50 kA. The superconductor material is NbTi for a 7.5 tesla maximum field. The coil is designed to survive at least 100,000 cycles of full bipolar half cycle sinusoidal operation from +7.5 tesla to -7.5 tesla fields in one second. The analysis shows that the coil design will meet or exceed all of the performance requirements. The coil is designed to be mechanically rugged and manufacturable.

25045 **Engineering, testing and manufacturing the general dynamics test coil for the Large Coil Program - an update.** Hackley, D.S.; Kruse, G.S.; Walker, D.L.; Mulroy, R.T.; Bailey, R.E.; Nash, D.R. (Gen Dyn, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 648-651(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

General Dynamics has reached the final stages of producing the magnet for the Large Coil Program (LCP). All superconductor and structural details have been completed along with the bobbin. Grade I and II conductor is complete and Grade I has been wound. Outer ring, torque box, and post-key subassemblies are welded and being readied for coil closeout. This article describes steps forward superconductor selection and manufacture, coil winding and structure.

25046 **Superconducting poloidal field coil studies for INTOR.** Turner, L.R.; Kim, S.H.; Smith, R.P.; Hunter, B.L.; Alcorn, J.S. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 756-759(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The U.S. INTOR team invested considerable effort in superconducting poloidal field (PF) coil studies, relating them to ongoing development programs for pulsed superconductors. A 50 kA Los Alamos National Laboratory (LANL)-type conductor was chosen as reference conductor, with a 100 kA conductor with surrounding channel support chosen as backup. Four distinctive features of the U.S. INTOR design are: (1) a PF coil system asymmetric about the midplane, resulting from the single-null divertor and the off-center plasma, (2) a central solenoid with separate segments for ohmic heating (OH) and equilibrium field (EF), (3) ring coils with combined OH and EF function, each with its own time history, and (4) ring coils mounted outside, but very near, the toroidal field (TF) coils. The force analysis must be carried out for all times of the cycle, and must include the fringe field from the TF coils. The forces on the ring coils can be reduced greatly, at little added expense, by moving the PF ring coils further from the TF coils.

25047 **Considerations for replacing PF coils on FED.** Spampinato, P.T. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1150-1153(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The poloidal field (PF) coil system for FED is designed for the life of the device. This paper describes the maintenance and disassembly procedures of the PF coil system for the FED Reference Configuration. The major steps involved in disassembling and handling the coils are presented, along with estimates of device downtime and an assessment of the mode of operations, i.e., contact, remote, or automated.

25048 **Soldering studies of an aluminum stabilized superconductor.** Hartwig, K.T.; Yu, D.; Zolliker, P. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1330-1332(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Soldering experiments are performed to determine a good solder composition and the best method of joining pure aluminum to multifilamentary NbTi superconductor wire. Solders containing Zn are found to severely embrittle aluminum during the soldering operation. Standard Sn40Pb and Sn50In solders as well as pure Sn, Bi, and Pb are not found to be embrittling. Of the methods tried for joining short lengths of composite wire, bath soldering is found to be more effective than joining electroplated aluminum. Ultrasonics holds promise for adaptation to the bath method.

25049 **Production experience: the Nb/sub 3/Sn forced flow conductor for the Large Coil Program.** Sanger, P.A.; Adam, E.; Grabinsky, G.; Gregory, E.; Ioriatti, E.; Roemer, F. (Airco Superconduct, Carteret, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1333-1336(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Nb/sub 3/Sn forced flow conductor for the Large Coil Program is a large extrapolation for several new superconducting technologies. The first area of development is the production of 12 tons of 0.7mm diameter multifilamentary Nb/sub 3/Sn wire. Reproducible superconducting properties and long piece lengths (up to 10,000 meters) have been achieved. The upgrading of normal welded tube mill practices to produce over 5km of defect-free, helium leak tight, welded tubing is another area where innovations have been necessary. The procurement and use of a special high strength and weldable alloy was required. Special leak checking techniques capable of measuring a leak of 10-/sup 14/ std. m/sup 3//s of helium have been developed. The lessons learned and the results obtained are discussed in this paper.

25050 **Torus design for the fusion engineering device (FED).** Kirchner, J.; Fuller, G.M. (McDonnell Douglas Astronaut Co, Oak Ridge, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1451-1454(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The torus of the Fusion Engineering Device (FED) provided a plasma chamber with the required vacuum integrity and nuclear shielding to protect personnel and to limit damage to sensitive components. The torus spool is the primary load-carrying structure and serves as the vacuum enclosures on the top, bottom, and inboard wall. A combination of the shield sector outer surface, a bellows seal systems, and the spool comprises the total vacuum system boundary. The inboard shield thickness of 60 cm is sufficient to meet the FED requirements to limit the heating rate in the inboard leg of the TF coils to 5 mW/cm/sup 3/. The 1.2-m-thick outboard shield meets the requirements of limiting personnel exposure to 2.5 mrem/h 24 hours after shutdown from 8-T operation or 2.5 mrem/h 36 hours after shutdown for a limited number of 10-T shots.

25051 **Tests of the first development coils for EBT-P.** Miller, J.R.; Lue, J.W.; Shen, S.S. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2012-2015(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Two superconducting coils have been built and tested as part of a development program aimed at proving the technology for production of a 36-coil TOROIDAL set for the Elmo Bumpy Torus Proof-of-Principle (EBT-P) machine. Both coils have demonstrated the capability of being charged reliably and rapidly for essentially continuous operation with simulated x-ray heat loads in excess of 10 W has also been demonstrated in both coils.

25052 **Argonne pulsed cable test facility for the development of superconducting ohmic heating coils.** Kim, S.H.; Krieger, C.I.; McGhee, D.G.; Turner, L.R. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2016-2018(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A Pulsed Cable Test Facility (PCTF) under development at Argonne National Laboratory (ANL) is described. A split-pair pulsed superconducting coil, which is the central feature of the PCTF, has been tested. Other facilities for the PCZTF are a nonmetallic cryostat, a 7-MW pulsed (2.9 MW rms) power supply for the pulsing of the split-pair coil, and a 50-kA, 5-V dc power supply for charging the testing pancake coils. Cable fabrication for the split-pair coil, winding of the coil, and initial test results of the coil are described.

25053 **Latest status of the Japanese LCT coil and the domestic test facility.** Shimamoto, S.; Ando, T.; Hiyama, T. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2019-2022(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Japan Atomic Energy Research Institute (JAERI), representing Japan, is now making one of six test coils for the International Energy Agency's (IEA) Large Coil Task(LCT). The Japanese LCT coil, which has a stored energy of 120 MJ, is based on a NgTi conductor, is pool-cooled, has a maximum field of 8T, and is edgewise, double-pancake wound, was completed in October, 1981. The LCT coil will be tested in the newly constructed domestic test facility up to its rated current in November, 1981, before transportation ORNL. The domestic test facility, which is composed of a cryogenic system a vacuum system, a power supply with protection system, and a data acqusition and control system, was completed and its performance measured at a new building for the LCT test at JSAERI in June, 1981. This paper describes the latest construction status of the Japanese LCT coil and the domestic test facility. The performance of the domestic test facility is described in this paper.

25054 **Results of the cooldown analysis of the Swiss LCT coil.** Marinucci, C.; Weymuth, P.; Vecsey, G. (Swiss Inst for Nucl Res, Villigen, Switz). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2023-2026(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Cooldown of the Swiss LCT coil from 300K to 4K is analyzed with a 2-dimensional heat conduction code applied to two perpendicular planes. A dynamic model to simulate the change of helium temperature during coldown is included. Results show that the coil can be cooled down in approx. 140 hours without critical temperature gradients in any of its components.

25055 **Progress renort on the tandem contribution to the IEA Large Coil Task.** Krauth, H.; Nyilas, A.; Ulbricth, A.; Zehlein, H.; Albrecht, C. (Kernforschungszent Karlsruhe, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2027-2030(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The European LCT-coil is presently in the manufacturing phase. This paper describes the present status with special emphasis on testing and quality control as they were performed in the design phase and as they are planned during the manufacturing phase as well as with the completed coil. The final design of the coil is presented as it looks after some changes introduced by the results of verification testing. Practice windings and impregnation test of dummy winding packs were performed to verify the manufacturing concept. Prototype of all essential coil components were produced and are presently being tested. Quality control plans were worked out for the fabrication of conductor, coil winding and coil case. After a final warm check of the coil at the manufacture site, the coil will be tested as a single COIL in the TOSKA facility to prove acceptance, gather cryogenic experience and assure reliable coil performance.

25056 **Advances in the cluster test facility and the test module coil development.** Shimamoto, S.; Ando, T.; Hiyama, T. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2031-2034(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Cluster Test Facility was constructed at the Japan Atomic Energy Research Institute (JAERI) to aid the development of superconducting tokamak toroidal coils. The Cluster Test Coils, constructed in 1980, are 20-MJ, NbTi, pool-coils. The Cluster Test Facility has already been operated twice. During the first operation in August, 1980, several technical problems were found. Thereafter, several improvements in the system were carried out, and a second operation was undertaken in April, 1981. The substantial effects of the improvements were revealed during this operation. This paper describes the results of the improvements and the advances in fabrication of the test Module Coil which will be tested in the facility.

25057 **Large-current conductor development for superconducting poloidal coils.** Tsuji, H.; Takahashi, Y.; Okuno, K. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2035-2038(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

For the development of superconducting tokamak poloidal coils, technical objectives and a concept for the development work are discussed. Based on the development program of large-current poloidal conductors, the Japan Atomic Energy Institute (JAERI) developed two pool-cooled 10-kA poloidal conductors (JA-10, JB-10) whose characteristics were measured. Based on these experiences, development of three conductors was started. These are a 50-kA pool-cooled flat-core conductor (JA-50), a 50-kA pool-cool cable-in-conduit (JF-50). Design parameters and characteristics of these conductors are described.

25058 **Shaping and controlling Dee-shaped tokamak plasmas.** Shinya, K.; Yokomizo, H.; Ninomiya, H.; Nagami, M.; Shimada, M.; Yoshida, H.; Izumi, S.; Ioki, K.; Kitsunezaki, A. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2039-2042(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A multipole field analysis of the equilibrium magnetic field was systematically carried out for various plasma shapes, positions and parameters. The hexapole field is proportional to the triangularity which enables easy control of the triangularity while the dipole of the independent of it. The elongation dependence of the quadrupole field is almost linear at low elongations the controllability of the elongation. Both the quadrupole field and the dipole field should be increased as /beta/sub //p increases, while the hexapole field should be decreased for a fixed plasma shape.

25059 **Development of large-scale thyristor dc circuit breaker.** Kobayashi, S.; Tanoue, Y.; Ikegame, H.; Matushita, T.; Sato, Y. (Toshiba Corp, Tokyo, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 378-381(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A study for developing a thyristor dc circuit breaker that is applicable to the Tokamak device for engineering feasibility is presented. The design and test of a unit circuit breaker consisting of 4kV-3kA thyristors connected 2 in series and 12 in parallel are described. And based on the results a 50kV-24kA thyristor dc circuit breaker is conceptually designed.

25060 **Design, fabrication and erection of flywheel-generator-convertors for the JET tokamak.** Huart, M. (JET Jt Undertaking, Abingdon, Oxfs, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 382-385(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The JET Power Supply Scheme relies on a combination of generator-convertors and mains driven transformer-rectifiers to supply power to the four major pulse loads, namely the toroidal field coils, the poloidal field coils, the plasma positioning coils and the additional heating. This paper describes the main characteristics of the mechanical and electrical design of the generators and the sequence of erection of the generators. It concludes with a review of the present status of the erection program.

25061 **JET ohmic heating circuit.** Helgesen, H.; Mondino, P.L.; Raymond, C.; Stella, A. (JET Jt Undertaking, Abingdon, Oxfs, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 386-389(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes the JET Ohmic Heating Circuit - a switching network in the Poloidal System of the JET Machine - that connects the driving energy source to the JET Torus to induce and maintain the plasma current. The sequential operation, including the protective action, is described. The basic design aspects for all components are reviewed and the status of manufacture and procurement presented. The components will be installed in 1982 and the whole system will be commissioned under CODAS remote control to be ready by Spring 1983.

25062 **Poloidal-field thyristor amplifier with improved power factor, for TEXTOR.** Lisser, J.; Bouwknegt, K.; Giesen, B.; Petree, F. (Holec Mach and Syst, Hengelo, Neth). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 390-393(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Rapid current control in highly inductive poloidal-field coils requires a regenerative converter whose output voltage is many times larger than the drop across the ohmic resistance. During the flat-top phase of the current pulse the converter is phased back, resulting in a relatively large ripple and high reactive power. Controlled freewheeling, using thyristors between the d.c. terminals of the three-phase thyristor bridge and the neutral of the transformer winding, improves the output waveform and reduces the reactive power drawn from the mains without reduction of the dynamic performance. This circuit is used in two 12-plus thyristor amplifiers 2500 V-15 kA for the vertical field and for ohmic heating in the Euratom/KFA-Juelich Textor experiment.

25063 **Commissioning tests for the TEXTOR toroidal field power supply system.** Giesen, B.; Petree, F.; Bekink, J. (Kernforschungsanlage Juelich, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 394-398(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The 2.0 Tesla toroidal magnetic field that confines the TEXTOR plasma is provided by a self-commutating 12-pulse thyristor bridge rectifier that can furnish 55 kiloamperes at 1000 volts dc to a 44 millihenry, 12 milliohm load. The first testing began with the application of electric power using a dummy load on 1. Feb. 1981, and with the toroidal field coils on 3. April. On 27 July the toroidal field system was placed under the control of the TEXTOR computer, and the toroidal field measurements began. On 9. September the first plasma was produced, and on 25. September TEXTOR produced an 0.88 second long, 105 kiloampere plasma. The main purposes of these tests were to 1) prove that the equipment can perform at its ratings 2) determine that significant parameters remain within tolerable limits and 3) develop information useful for later checking of the equipment.

25064 **4000 shots with the ASDEX ohmic heating breaker.** Wedler, H.; van Mark, E. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 399-402(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Experience with the ASDEX OH system and, in particular, the pressurized air blast breaker AP 4970 is reported. The Low loop voltage found in ASDEX and its implications for tokamaks of the next generation are discussed.

25065 **Power supplies for the Varennes tokamak a quasi-continuous operation experiment.** Harbec, G.; Przysiezniak, R. (Hydro-Que, Varennes, Can). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 403-406(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The basic design of the power supplies for the Varennes Tokamak experiment has been given. They fulfill the requirements for the machine operational modes A, B and C and minimize the peak power demand from the grid. Circuit simulation studies are well under way and some results given here.

25066 **Development of a high voltage crowbar.** Zubair, K.M.; Rodine, R.R. (Aydin Energy Div-Transrex Facil, Carson, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 423-426(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In high voltage applications, a multi-stage ignitron crowbar can be used as an effective energy diverter. The advantage of a crowbar over conventional spark gap is its ability to fire at any desired voltage. In this article, development of a prototype 300 kV multi-stage crowbar has been described with emphasis on the problems associated with achieving reliable and spark free operation.

25067 **TFTR neutral beam test facility.** Turitzin, N.M.; Newman, R.A. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 431-434(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

TFTR Neutral Beam System will have thirteen discharge ion sources, each with its own power supply. Twelve of these will be utilized for supplemental heating of the TFTR tokamak plasma, while the thirteen will be dedicated to an off-machine test chamber for source development and/or conditioning. A test installation for one source was set up using prototype equipment to discover and correct possible deficiencies, and to properly coordinate the equipment. This test facility represents the first opportunity for assembling an integrated system of hardware supplied by diverse vendors, each of whom designed and built his equipment to performance specifications. This paper discusses various system components, their characteristics, interconnection and control.

25068 **2.0 MVA voltage doubler power supply for capacitor bank charging.** Merritt, B.T.; Tarter, R.; Button, J.B. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 438-441(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A 2.0 MVA voltage doubler power supply for capacitor-bank charging has been designed by LLNL, and a prototype has been constructed by Aydin Energy Division. This paper discusses the acceptance testing of the prototype, operational experience to date, and transients during operation. In addition, it will comment on the design rationale for the supply, the design of the transient supression networks, and protection for these supplies.

25069 **Application of power factor correction in the Tandem Mirror Experiment upgrade magnet power supply.** Corvin, W.C. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 442-443(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The magnet power supply for the Tandem Mirror Experiment Upgrade (TMX Upgrade) is described, which contains 24 groups of dc rectifiers that feed the water-cooled magnets. Each

group consists of five or less rectifiers, connected in series. All 24 are current-regulating, using phase-controlled bilateral thyristors in the rectifier transformer primaries. The electric utility system must furnish reactive power to these phase-controlled thyristors as well as to the commutating diodes in the rectifier bridges. The basic configuration of the magnet power supply are illustrated.

25070 **10 kA pulsed power supply for superconducting coils.** Ehsani, M.; Fuja, R.E.; Kustom, R.L. (Tex A and M Univ, College Station, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 460-462(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A new 4 MW inductor-converter bridge (ICB) for supplying power to pulsed superconducting magnets is under construction at Argonne National Laboratory. This is a second generation ICB built at Argonne Lab. The analytical, design, and control techniques developed for the first prototype have been used in the design of the new system. The paper presents the important considerations in the design of the new ICB. A brief description of the operation of the circuit is also given.

25071 **INTOR power handling and conversion.** Bronner, G.; Gorker, G.E.; Murray, J.G.; Thomson, S.L.; Vogel, H.F. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 752-755(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The purpose of this paper is to define the electrical power requirements for INTOR and describe the power handling and conversion systems proposed for meeting those requirements. The power handling and conversion systems consist of the ac power, energy storage, and power conversion systems for supplying the steady state and pulsed electrical loads.

25072 **Safety procedures for the MFTF sustaining neutral beam power supply.** Wilson, J.H. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 868-871(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The MFTF SNBPSS comprises a number of sources of potentially hazardous electrical energy in a small physical area. A 'defense in depth' approach is used; interlocks are provided in the hardware to make it difficult to gain access to an energized circuit, and the operating procedure includes precautions which would protect personnel even if no interlocks were working. The complexity of the system implies a complex operating procedure, and this potential complexity is controlled by presenting the procedure in a modular form using 37 separate checklists for specific operations. The checklists are presented in flowchart form so contingencies can be handled at the lowest possible level without compromising safety.

25073 **Optically insulated power supply for high voltage instruments.** Nudelman, A.; Ashcroft, D.L. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 958-959(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Electronic instrumentation and control devices, 'floating' at high voltage potentials, are commonly affected by a high level of electrical noise. An investigation of the possible noise source shows that elimination of the 60 Hz power supply could be a major step toward the noise protection. This paper discusses the possibility of replacement of the regular AC instrument power supply by an optically insulated power source based on power photovoltaic cells. The light source would be operated near ground potential.

25074 **Power supply for the poloidal coil of tokamak fusion reactor.** Shintomi, T.; Masuda, M. (Natl Lab for High Energy Phys, Ibaraki, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1414-1417(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes the history of the power supplies of the accelerators which have had some operation mode as one of the poloidal coils, the problems of the poloidal coil power supply, and the effective applications of the superconductive magnet energy storage to these power supplies. Also described is the shielded pulse superconductive energy storage which is suitable for the power supplies of the poloidal coils.

25075 **Plasma striking voltage production.** Bellomo, P.; Calpin, J.E.; Cassel, R.L.; Zuvers, H. (Ebasco Serv Inc, Princeton, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1427-1430(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TFTR ohmic heating pulsed energy conversion system not only heats the plasma but also develops the plasma striking (ionizing) potentials. Generation and control of these potentials is exercised by six interrupters and six metal resistors. Operating in concert, these components can produced a maximum system voltage of 150 kV. The TFTR 600:1 OH coil-to-plasma turns ratio yields a 250 V plasma striking potential. Plasma striking voltage generation and the salient features of the interrupters and metal resistors are described.

25076 **Reliable trigger unit for rail gap swtiches.** Oicles, J.A.; Fulkerson, E.S.; Mass, B. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1431-1434(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A thyratron based trigger unit is described which is suitable for triggering gas switches. The system configuration employs two identical units for full redundancy, each providing a 45 kilovolt pulse into a 25 ohm resistive load. Failure monitoring, based on timing measurements, ensures against hidden failures.

25077 **TFTR grounding system.** Faulkner, F.K.; Moo, W.; Neumeyer, C.; Zuvers, H. (Ebasco Serv Inc, New York, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1438-1441(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper outlines the rationale and concepts which led to the TFTR grounding system. Examples of induced voltages and voltage gradients expected during plasma disruption are presented. The methods of voltage gradient control and grounding connections are described. In addition to conventional grounding arrangements for equipment housings, fences, cable trays, special requirements for the vacuum vessel, TFTR coil cases, PF coil surfaces and umbrella-like support structures are described. Arrangements for diagnostic grounds which are designed to minimize interference from the facility ground also are described.

25078 **EBT-P plasma heating system instrumentation and control design.** Weaver, T.L. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 72-75(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The instrumentation and control system for the EBT-POP plasma heating systems consists of a three tiered structure. Tier one is a limited scope, high speed, hard-wired personnel and equipment safety system. Tier two is a distributed control system based upon and industrial process controller. It is used for general operational control of the plasma heating system. Tier three is a CAMAC

based system utilized purely for the acquisition of data which is useful, but not necessary to the operation of the device.

25079 **Driver options for steady-state tokamak reactors.** Ehst, D.A. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 708-711(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper presents results from two theoretical studies of wave-driven currents in large tokamaks. A lower hybrid (LH) system was designed in detail for STARFIRE, a fuel-scale commercial reactor. The results of this first study indicated that the LH system was workable from an engineering and maintenance viewpoint, but accessibility constraints on the wave prevented wave penetration to the high density plasma interior. To improve upon the STARFIRE results a survey of other wave drivers was conducted in order to identify those waves which more efficiently generate centrally-peaked current density. All calculations in this second study were applied to a demonstration tokamak power reactor (DEMO) which is similar to INTOR in size but has a high current (I ? 9MA) and high beta (/beta/? 0.080). The goal of present survey is to find which wave maximizes the net electrical power produced by the DEMO.

25080 **FRTP prototype power reactors with neutral-beam heating and pellet injection.** Fang, Q.T.; Gilligan, J.G.; Hsiao, M.Y.; Miley, G.H. (Univ of IL, Urbana, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 712-714(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Field-Reversed Theta Pinch (FRTP) represents a promising confinement approach to fusion power. This has become more evident because of the favorable confinement scaling that has been predicted based on studies of Loss-Cone Scattering Transport (LCST). Therefore, a step toward the FRTP prototype power reactors is proposed. The potential advantaes of the FRTP reactors includes: 1) high /beta/and hence high power density, 2) compactness, 3) high density (10/sup 15/ -10/sup 16/ cm-/sup 3/) and readily hot (1-3keV) plasma formed by implosion, compatible with further (neutral-beam) heating, 4) simple linear geometry and hence easy modular production and maintenance, and 5) easily coupled direct energy conversion. Neutral-beam heating and pellet refueling are assumed in these reactors, serving simultaneously for heating, refueling and maintaining the field reversal and the plasma moment of inertia.

25081 **Installation and start-up of the PDX neutral beam injection system.** Williams, M.D.; Eubank, H.P.; Kozub, T.; Kugel, H.W.; Rossmassler, J.E.; Schilling, G.; VonHalle, A. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 760-762(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The PDX Neutral Beam Injection System consists of four beamlines of basic PLT injector design with changes primarily related to the containment of increased beam power and pulse length. The beams are driven by four ORNL developed duopigatron ion sources rated at 50 kilovolts and delivering 1.5 megawatts H/ degree/or 2 megawatts D/degree/each to the PDX target plasma. The early attainment of 8 megawatts of D/degree/injected into the PDX was due to thorough conditioning of each ion source by ORNL prior to delivery coupled with several field design changes and improvements made as a result of injector experience on the PLT.

25082 **Performance of the ASDEX neutral beam injector.** Staebler, A.; Vollmer, O.; Baeumler, J. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 767-770(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The first of two neutral beam injectors for the ASDEX tokamak has been put into operation. The design value of 1.25 mw neutral power into ASDEX was obtained within a few weeks of operation; the injection system was found to work quite reliably. Beam power mesurements have shown a transmission of total power to the beamline calorimeter of 70%, a neutralization efficiency of 60 %, reionization losses between magnet and torus of less than 10 %, and geometric losses within the duct of a few percent, resulting in a neutral power offered to the plasma between 35 % and 40 % of the drain power. Measurements have been performed concerning the properties of the Ti-evaporator pumping system. The results are compared with beamline code calculations.

25083 **Experience with the Wendelstein VII-neutral injectors.** Ott, W.; Penningsfeld, F.P.; Cooper, D.; Freudenberger, K.; Probst, F.; Ringler, H.; Speth, E.; Suess, R. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 779-782(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The reliability of the injector systems for W VII-A has been improved. The factors which had reduced their availability during three experimental periods are outlined. A serious problem remaining in this injection experiment is radiation of plasma impurities during injection. The source of plasma impurities has not yet been identified with certainty. Theoretical and experimental evidence demonstrating the increase of plasma radiation due to impurities in the neutral beam is presented.

25084 **Highlights of the Zephyr neutral beam injection system conceptual design.** Cooper, W.S.; Anderson, O.A.; Elischer, B.P.; Goldberg, D.A.; Hopkins, D.B.; Jacobson, V.L.; Lou, K.H.; Tanabe, J.T. (Lawrence Berkeley Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 783-786(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In June, 1980, the Lawrence Berkeley Laboratory (LBL) began a conceptual design study for a 160 keV, remotely maintainable neutral beam injection system (NBIS) for the ZEPHYR ignition tokamak proposed by the Max-Planck-Institut fuer Plasmaphysik. The ZEPHYR project was cancelled, and the LBL design effort concluded prematurely in January, 1981. This report describes the conceptual design as it existed at that time, and gives brief consideration to a schedule, but does not deal with costs.

25085 **Beam trajectories calculation code for ion source in neutral beam injector.** Nishimura, H.; Sato, T.; Isobe, S. (Hitachi Ltd, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 787-790(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A beam trajectory calculation code, HIBOC is developed, which simulates ion extraction from plasma and acceleration through an electrode structure in an ion source for beams generated by a neutral beam injector. This paper describes not only the principles of the HIBOC calculation code but also several numerical techniques used in the formulation of the code. The calculated values are compared with the experimental ones obtained by L.R. Grisham et al. The results show that the program can be used to explain beam trajectory profiles.

25086 **Gas density distribution results for NBSTF.** Feist, J.H. (Lawrence Berkeley Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 791-794(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The gas density at some points of the beam path in the TFTR Neutral Beam System Test Facility (NBSTF) has been measured. If compared with previous calculations, the density is larger that expected. This is caused by a conductance limitation of the installed cryopumps and by a low gas temperature. No evidence for the presence of an abnormally forward peaking of the

streaming gas out of the neutralizer and for excessive desorption of gas molecules by fast beam particles has been found.

25087 **Conductance thermal accommodation and beaming from neutralizer gas-cells.** Hemmerich, J.L.; Deksnis, E.B. (Kernforschungsanlage Juelich, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 795-797(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Measurements on neutralizer gas-cell models show, that toward the limit of their usual operating pressure range both conductance and gas density are inversely proportional to the temperature of the gas-cell walls. Beaming profiles were measured for neutralizers of rectangular cross-section, ie 1/0'th scale models of JET neutralizers. Results do not show very strong gas streaming, the exiting distribution being very close to a cosine squared distribution. Monte-Carlos computation with a simple model predict a peaked profile. Present experiments indicate the interaction of gas-particles and duct walls to be complex and velocity dependent.

25088 **Development, fabrication and tests of the periplasmatron ion sources for ASDEX.** Bonnal, J.F.; Druaux, J.; Fois, M.; Oberson, R.; Tual, D. (CEA, Fontenay-aux-Roses, Fr). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 802-805(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The ASDEX neutral injection lines are equiped with 8 Periplasmatron ion sources which have been built and tested at Fontenay-aux-Roses under contract from IPP (Garching). The technical clauses of the contract insist on the obtention of a high reliability rate (greater than 80 % at nominal performances). This paper first describes the most recent improvements obtained during the tests of the sources. Then the definitive characteristics of the series sources and the results of the tests of qualification are summarized.

25089 **Damping elements in the high-voltage circuits of the ASDEX neutral injectors.** Kunze, R.C.; Lohnert, H. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 811-814(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper deals with a so-called snubber-transformer, introduced into the power supply cables of a high power ion-source in order to control the well known harmful effects of high-voltage breakdowns. The snubber transformer is a coaxial aircoil transformer, which is loaded with an R, C circuit. It is installed at the source-end of the multipole power cable and is a part of the cable itself. The exact dimensions of the various circuit elements have been determined with a computer program.

25090 **Doublet III neutral beam power system.** Nerem, A.; Beal, J.W.; Colleraine, A.P.; LeVine, F.H.; Pipkins, J.F.; Remsen, D.B. Jr.; Tooker, J.F.; Varga, H.J.; Franck, J.V. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 815-818(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Doublet III neutral beam power system supplies pulsed power to the neutral beam injectors for plasma heating experiments on the Doublet III tokamak. The power supply system is connected to an ion source where the power is converted to an 80 kV, 80A, 0.5 sec beam of hydrogen ions at maximum power output. These energetic ions undergo partial neutralization via charge exchange in the beamline. The energetic neutral hydrogen atoms pass through the Doublet III toroidal and poloidal magnet fields and deposit their energy in the confined plasma. The unneutralized ions are deflected into a water-cooled dump. The entire system is interfaced through the neutral beam computer instrumentation and control system.

25091 **Magnetic shielding and eddy current effects measurements in a Doublet III neutral beam injector.** Fasolo, J.A.; Kim, J.; Pipkins, J.; Treglio, J. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 819-822(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Doublet III(D-III) neutral beam injectors are immersed in the fringe fields of the ohmic heating and poloidal field coils. Measurements of the fields penetrating into the shielded regions of one of the injectors have been made with the ion sources and their shielding removed. The shielding measurements were made during D-III shots for which the ohmic heating flux swing was 2.4 V-sec. Measurements of the changes in two components of the field in going from one side of the copper cryopanel to the other were not sufficiently accurate to permit a calculation of the room temperature pressure on the panel at the point of measurement.

25092 **Design and development of an electronic crowbar for the protection of HVDC neutral beam components.** Hesselgrave, D.H. (Aydin Energy Div, Palo Alto, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 826(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

25093 **Icrf antenna design for a 3 MW, 3 s heating system on the TEXTOR tokamak.** Noterdaeme, J.M.; Weynants, R.R.; Messiaen, A.M. (K Mil Sch, Brussels, Belg). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 831-834(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The design of the antenna system and of its interface with the transmission line to be installed on the TEXTOR tokamak as part of a complete multimegawatt rf heating system is described. Each of the two antennas is designed to couple 1.5 MW during 3 s at about 27 MHz. Transmission line theory and plasma coupling codes are used to define the antenna dimensions. The mechanical constraints imposed by the presence in TEXTOR of a hot (600/degree/C) liner are identified. The antennae are mounted on a reinforced section of this liner. A special design of the interface allows for differential thermal dilatation and leak-free passage for cooling of the feedthroughs.

25094 **Mechanical aspects of the design of a lower hybrid frequency grill launcher for the Joint European Torus (J.E.T.).** Lipa, M.; Melin, G.; Rey, G.; Tonon, G. (EURATOM, Grenoble, Fr). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 839-843(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The main goal of this study is to define an RF heating system on the grounds of the state of the art of both experiment and theory. Such an rf system should have the capability of coupling 15 MW to the plasma core of JET during 10 sec by taking into account the JET plasma parameters as well as technical constraints due to the specific environment of the JET facility. The features of the coupling system necessary to permit heating of the JET plasma up to plasma temperatures of 10 KeV and plasma densities higher than 10/sup 14/cm-/sup 3/ have been established from both theoretical and numerical considerations. This study results in the choice of a frequency of 1,5 GHz. The grill launcher which has been studied is composed of four horizontal rows of ten waveguides each and is located in one of the main ports of the torus.

25095 **High voltage rf coaxial vacuum bushing design considerations.** Greenough, N.L.; Grotz, G.F. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 844-847(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A high-voltage vacuum-barrier feedthrough bushing is required to feed ICRF heating power into the PLT tokamak. The bushing is located in a high voltage, low current portion of the transmission line feeding the antenna. High voltage breakdown problems provided the impetus to modify and test the existing feedthrough bushings, develop a computer program for stress analysis and create a new cone bushing design for increased power handling capability. The test facility supports complete component testing under controlled, instrumented conditions.

25096 **Design of a 9 inch stub tuner for PLT icrh operation.** Bohr, A.H. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 848-850(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

After several years operation of the Princeton PLT Machine, it was desired to replace the present 9 inch stud tuner system with a new design aimed at the elimination of wear and tear which has occurred. The new design uses a coaxial screwjack drive as compared to the previous off-axis drive. An existent motor-gearing-sensing drive developed at the Plasma Physics Laboratory is used as a packaged drive. Greatly increased activity in ICRH (Ion Cyclotron Resonance Heating) operations on PLT has created the need for these stub tuner improvements.

25097 **1.2 megawatt, 800 MHz rf generator for lower hybrid resonance heating.** Schnabl, F.J.; Martin, A.R.; Newman, W.G. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 851-854(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes an RF heating system capable of providing an RF power output of 1.2 Megawatts at 800 MHz for the PLT machine. The RF generating system utilizes six Varian VA-955 UHF, TV Klystrons operating in parallel to generate the output power. Pulse widths can be varied from 1 millisecond to 500 milliseconds by means of six modulator/regulators which utilize Eimac 4CX35000 Tetrodes as the switch tubes. Detailed circuit description of the various major component parts of one of the six RF channels are provided along with some of the major design considerations.

25098 **Beam waveguide launcher for high power ecrh heating in large tandem mirror machines.** Beyer, J.B.; Scharer, J.E.; Audenaerde, K. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 855-857(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

It has been shown that a quasi-optical feed system for plasma heating in fusion reactors is totally compatible with the reactor constraints. Such a system allows multiple medium power gyrotron sources to be combined into intense beams which can be focused onto the plasma in a well defined cone. The antenna system is derived from an offset cassegrain and employs gaussian beams which give good energy concentrations without breakdown and are characterized by an absence of side lobes. The antenna system also isolates the sources from neutron flux and allows the gyrotrons to be located well away from strong magnetic fields as well as providing for good vacuum pumping in the intervening region.

25099 **FED and starfire icrh systems.** Freije, S. (TRW, Redondo Beach, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 859-863(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Conceptual designs for the ICRH systems for FED and STARFIRE are described. These two tokamaks differ in both the major design emphasis and the parameter regime, e.g. field strength and subsequently the required heating frequency. The impetus for the FED design was primarily heating with a maximum power requirement of 50 MW. The selected heating mechanism was the second harmonic cyclotron resonance of deuterium, at 54 MHz. A dielectric filled single ridged waveguide was chosen as the optimum launcher. STARFIRE on the other hand was designed on the basis that current drive was a major requirement. A multiple frequency system was designed to drive current via the low phase speed magnetosonic wave at 154 MHz and to bulk heat with the third harmonic of deuterium at 132 MHz.

25100 **Icrh system characteristics.** Freije, S. (TRW, Redondo Beach, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 864-867(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Ion cyclotron heating was selected for detailed design analysis for the FED and STARFIRE concepts as part of a review of the various rf methods used to heat tokamaks. The discussion of the two ICH systems will be given in two papers: this one is entitled 'ICH System Considerations,' and the accompaning paper is 'FED and STARFIRE ICH Systems.' Here, the basic components of an ICH system for an advanced device are described, including issues and theory.

25101 **Analysis of optimal control theory applied to plasma position and current control during neutral beam heating in TFTR.** Firestone, M.A.; Rossi, M.; Gran, R. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 872-875(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A linear dynamic model of the plasma-poloidal field coupling in TFTR has been developed and used to design a linear optical control feedback system for controlling plasma position and current. This paper considers the pre-compression, neutral beam heating region of a strong compression discharge and develops a methodology for analysing and evaluating the feedback. By utilizing a nonlinear realistic simulation of the plasma-poloidal field interaction, a more physical and accurate picture of the closed loop dynamics emerges.

25102 **Development and operation of PDX neutral beam computer system.** Kozub, T.; Rossmassler, J.E.; Eubank, H.P.; Kugel, H.W.; Schilling, G.; von Halle, A.; Williams, M.D. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 912-915(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Poloidal Divertor Experiment (PDX) is a tokamak experiment designed to study impurity control through the use of magnetic divertors utilizing four neutral beams for heating. Each beamline is equipped with a 30 cm diameter ORNL source providing either 1.5 MW H/degree/or 2.0 MW D/degree/. The four neutral beam injectors have succeeded in reliably delivering 7 megawatts of neutral beam power into PDX. The PDX neutral beam computer system supports the operation of the beamlines including ion sources and related diagnostics. A dedicated DEC PDP 11/34 computer is interfaced to the neutral beam components through a five crate CAMAC parallel/serial highway system.

25103 **Design and development of the torus gas injection control system for TFTR.** Rauch, W.A. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 920-923(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The purpose of the Gas Injection Control system (GICS) is to control the flow rate of gas injected into the torus of Princeton's Tokamak Fusion Test Reactor (TFTR). The GICS is a computer controlled system similar in function to the manually controlled analog system used on Princeton's Poloidal Divertor Experiment (PDX). Capabilities of the system include open and closed loop pulse control, and steady state control, of gas injection into the torus. In the closed loop mode this system essentially samples deviations in various machine parameters and operates on them to formulate a flow control signal proportional to the deviations.

25104 **Very high level neutral beam control system.** Elischer, V.; Jacobson, V.; Theil, E. (Lawrence Berkeley Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 941-944(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In this paper we restrict ourselves to a general discussion of neutral beam control and to principles we believe contribute to a successful system. In particular, we believe the system is based on a control hierarchy with two essential feactures; (1) Its levels reflect actual stages of beamlines construction and operation. This tends to encourage appropriate software done at an appropriate time. (2) There is an explicit recognition that data produced at any level must be saved and available for use at higher levels. This tends to make a system which grows by building on previous work, rather than by redoing it. In the following sections of this paper, we first discuss the control hierarchy in general followed by a description of its levels. Often the control structure leads to a particular software methodology and we enlist these cases as examples of the usefulness of the hierarchy.

25105 **Control of a high-power neutral beam generator by means of arc-current regulation.** Lietzke, A.F.; deVries, G.J. (Lawrence Berkeley Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 945-948(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Preliminary tests of a method for regulating the accelerator perveance of a high-power neutral beam, by controlling the plasma source have been conducted and are encouraging. The phase shifts and feedback paths were identified and quantified, and stabilization was achieved by adding and R-C snubber at the accelerator power supply output which reduced the destabilizing phase lags. The incorporation of such regulators into future systems is envisioned to make these high-power neutral beam systems cheaper and easier to operate.

25106 **Cable information retrieval program.** Murray, H.A.; Calaby, L.F.; Davis, J.E. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1040-1043(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TFTR Neutral Beam System contains in excess of 55,000 wires ranging from high voltage cable to instrumentation wire. A program has been written to generate and organize the information required for cable procurement, tray design, cable installation, inventory control and system trouble shooting. This program is designed to accommodate a number of initially identical systems which may be modified and upgraded individually. Selective information for field installation may be generated. Information formals for cable inventory information, calbe characteristics, estimated pull lengths, plan point data, and wire signal description. A program which demonstrates all the capabilities of the system has been written for user instrucdtion.

25107 **Future needs for neutral beams in fusion.** Stewart, L.D. (Exxon Nucl Co, Princeton, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1337(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Examination of design studies for future mirror and tokamak devices reveals neutral beam performance requirements which are beyond present development program accomplishments. These performance requirements are then the development needs and can be grouped into three time frames: Requirements for near term physics experiments (before 1980). Requirements for the FED/TMNS time frame (1990-1995), and requirements for a fusion demonstration plant (FDP; about 2005). For the near term, the development needs are longer pulse lengths and a higher full-energy fraction for positive ion based systems. For the FED/TMNS time frame, additional needs are 150-175 keV systems with direct recovery (for FED or INTOR heating), 200-400 keV (for mirrors and for tokamak current drive experiments), longer pulse (to essentially steady-state), and possibly tritium injectors. The additional need in the FDP time frame would be 2 MeV beams for tokamak current drive.

25108 **Status of the JET neutral injection system.** Altman, H.; Brookes, C.; Dines, A. (JET Jt Undertaking, Abingdon, Oxfs, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1338-1341(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The present status of the physics design and engineering of the JET neutral injection system is presented. The system is designed to deliver 5 MW of full energy 80 kV neutral atoms with a pulse duration of 10 sec. All the components for eight beam lines are arranged in a single compact structure which is enclosed in a large vacuum tank.

25109 **Prototype ion source for JT-60 NBI.** Tanaka, S.; Akiba, M.; Horiike, H. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1342-1346(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The present paper describes the characteristics of the 75 keV/35 A/0.1 sec source, including the arc efficiency, beam optics and the composition of ion beam species. Secondly it describes the heat loading in the 70 keV/6 A/10 sec source and the results of durability test of two types of grids; one is molybdenum grid on which copper pipes are brazed and the other molybdenum pipes are brazed. Finally, it reports about the ion sources which reflect the results described here and have been fabricated and installed on the prototype unit of JT-60 NBI.

25110 **Construction of prototype injector unit for JT-60.** Kuriyama, M.; Akiba, M.; Akiba, M. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1347-1351(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A prototype neutral beam injector unit for JT-60 has been constructed prior to fabrication of 14 injector units for JT-60 to confirm system performances of a beam line and a power supply unit. Basic performance for the prototype unit is an injection power of 1.5MW neutral hydrogen atoms at 75keV, up to 100 kV, with a pulse length of as long as 10 sec for every 600 seconds. The prototype unit has been already fabricated and installed in JAERI and is now under testing.

25111 **Design of calorimeter and ion dump for JET neutral injection beam line.** Haange, R. (JET Jt Undertaking, Abington, Oxfs, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1352-1355(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The JET neutral injection beam line consists of a large neutral injection box (approx. 7m x 3.6m x 3m) with eight 'PINI's' (Plug-In Neutral Injector) attached to its back panel. The PINI's are mounted in two vertical banks of four. The charged particles are separated from the neutrals during the passage through a deflection magnet and are subsequently intercepted by full energy ion dumps and fractional energy ion dumps. The neutralized beam can be intercepted by a calorimeter which can be rotated out of the beam to allow injection into the plasma. The design of the calorimeter and full energy ion dump are the subject matter of this paper.

25112 **Status and trends in the development and application of positive-ion-based neutral injectors.** Menon, M.M. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1356-1359(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The present status of the technology of positive-ion-based neutral injectors is examined with particular reference to the Oak

Ridge National Laboratory neutral beam development program. It is shown that the development and application of multi-megawatt neutral beams have been quite successful. Injector parameters that have been utilized and those that are planned to be utilized in various confinement devices are examined. Development needs for the upcoming applications are shown to be primarily in the area of extending the beam pulse length to several seconds.

25113 **Improved plasma generator for the PLT/PDX neutral beam injectors.** Schilling, G. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1519-1521(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Neutral beam injection heating of experimental plasmas confined in the PLT tokamak was initiated in the summer of 1977. Four injectors developed and fabricated by the Fusion Energy Division of the Oak Ridge National Laboratory [1]became operational by the spring of 1978, and hot plasmas were achieved in the summer of 1978. Since the total power injected into the tokamak simultaneously by all four beams fell short of that expected (3MW H/degree/) on the basis of single-beam test stand operation, and it had been quite difficult to drive some of the ion sources up to the higher power levels, injector improvement was attempted. It was possible to improve the ion source plasma generator performance by a relatively simple change in arc arc circuit.

25114 **Industrialization and production of neutral beam ion sources for MFTF.** Lynch, W.S. (RCA, Lancaster, PA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1530-1533(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The existing LLNL designs of the 20 and 80kV deuterium fueled Neutral Beam Ion Source Modules (NBSM) have been industrialized and are being produced successfully for the MFTF. Industrialization includes value engineering, production engineering, cost reduction, fixturing, facilitation and procurement of components. Production assembly, inspection and testing is being performed in a large electronics manufacturing plant. Decades of experience in high voltage, high vacuum power tubes is being applied to the procedures and processes. Independent quality and reliability assurance criteria are being utilized. Scheduling of the various engineering, procurement and manufacturing task is performed by the use of a Critical Path Method (CPM) computer code, Innovative, computerized grid alignment methods were also designed and installed specifically for this project. New jointing and cleaning techniques were devised for the NBSMs. Traceability and cost control are also utilized.

25115 **Engineering design and manufacturing of prototype neutral injector for JET.** De Vere, A.P.C.; Scholes, R.E.; Altmann, H.; Bottiglioni, F. (Culham Lab, Abingdon, Oxfs, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1534-1537(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The first of Neutral Injection heating on JET requires injection of 5 MW of 80 neutral atoms into the plasma torus for times in excess of 10 sec. Eight injectors, each rated at 80 kV and 60 amp of hydrogen ions, will be required to provide this nett 5 MW of full energy hydrogen atoms. This paper describes the engineering design and manufacturing aspects of the prototype versions of these injectors, which are currently referred to as Plug-In Neutral Injectors. In particular the philosophy of accurate alignment of the tetrode accelerator structure on a high voltage insulated flange will be discussed in conjunction with the problem of active cooling of grids.

25116 **Design of the precast, post-tensioned concrete shielding structure for the TFTR neutral beam test cell.** Kaminsky, E.L.; Nilsson, E.T. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1546-1547(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

At the TFTR facility, the Neutral Beam Test Cell is a room separated from the TFTR Cell by a 4-foot-thick concrete wall and devoted to testing the neutral beam injector. The function of the shielding structure is to protect personnel from radiation casued by pulsing the injector. The distance from the TFTR device to the injector is large enough to permit use of magnetic materials in the shielding structure, and the neutron flux levels are small enough so that ordinary concrete of moderate thickness may be employed. Radiation considerations are not discussed in this paper, which is devoted to a description of the structural design of the shield.

25117 **Cyrogenics for TFTR neutral beam test cell.** Tasoulias, G.W.; Wright, K.E. (Grumman Aerosp Corp, Bethpage, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1609-1612(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

25118 **Pneumatic hydrogen pellet injector development at Oak Ridge National Laboratory.** Lunsford, R.V.; Foster, C.A.; Milora, S.L. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1721-1724(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes the design of the second and third generation pneumatic devices which are being developed at ORNL. A four shot injector has been designed and operated and is currently installed on the PDX device at PPPL. A modified four shot has been designed for use on the MIT Alcator C DEVICE. The Advanced Pneumatic Injector is a development project. It's purpose is to demonstrate acceleration of 2-mm pellets at a repetition rate of 10 s/sup -1/.

25119 **D/sub 2/ - pellet injection system.** Buechl, K.; Andelfinger, C.; Kollotzek, H.; Lang, R.; Ulrich, M. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1725-1728(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

For density build-up of a target plasma for neutral injection in the stellarator "Wendelstein W VIIA"and for refuelling of the divertor tokamak ASSDEX, pellet light gas guns have been developed. In a continuous flow cryostat cooled by liquid helium with a comsumption of 2 - 3 liter liquid helium per hour deuterium was condensed and solidified. To prevent the propeller gas entering the torus was used. In one system a 3.6 mm guiding tube following the barrel was applied successfully. By optical diagnostics pellet velocity, pellet size and pellet trajectory is measured. For a pellet centrifuge system investigations of carbon fiber rotors were made up to surface velocities of 1500 m/s.

25120 **Overview of DOE gyrotron development program.** Murphy, M.; Haas, G. (US DOE, Washington, DC, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2101-2104(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A significant budget increase in FY80 helped to establish a multifaceted gyrotron development program within the Department of Energy (DOE) Office of Fusion Energy (OFE) with efforts at a university, two Government laboratories, and two industrial firms. A 28 GHz gyrotrons has been operated reliably at >200 kW. Development of >100 GHz devices at 200 kW, cw and then at multimegawatt, cw is projected for the future.

25121 **Gyrotron - an ECH system component.** Loring, C.M.; Eason, H.O.; Kimrey, H.D.; Jory, H.; White, T.L.; Evans, S.J. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2105-2108(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The gyrotron is a sources of millimeter wave energy for fusion plasma heating. The characteristics of this high power, efficient electron tube are related to the requirements for its support systems. The effects of various operating parameters upon the gyrotron's behavior are discussed. Data from development and system operation are shown.

25122 **Recent progress in fusion gyrotron development.** Shively, J.F.; Stone, D.S. (Varian Assoc Inc, Palo Alto, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2109-2112(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The gyrotron, a microwave tube capable of producing high power output at millimeter wavelengths, has recently found applications for electron cyclotron resonance heating of plasmas in controlled thermonuclear fusion reactor experiments. This paper describes work in progress to develop a gyrotron oscillator to deliver 200 kW CW at 60 GHz (/lambda/sub //? 5 mm). A pulsed oscillator is described which produced over 200 kw peak power. A CW oscillator is under construction. The latest experimental results are presented.

25123 **60 GHz ecrh system for the PPL PDX machine.** Bowen, N.; Doane, J.; Newman, W. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2122-2125(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A 60-GHz kW Electron Cyclotron Resonance (ECR) heating system for the PDX machine is now under construction. It will use two of the pulse-type 60 GHz gyrotrons now being developed by Varian for the U.S. Department of Energy under a subcontract for Oak Ridge National Laboratory. The system will be used for various temperature profile, start-up, and heating experiments. This paper describes the design of the system and its physical configuration.

25124 **Compact tritium removal equipment for air cleanup of glove box.** Yamaguchi, K.; Kudo, H.; Makimoto, Y.; Shikata, E. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1165-1168(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A compact removal equipment (TRE), assembled in a console with casters, has been developed for air cleanup of a glove box to be used for handling tritium in some 10 curies. The TRE was designed to remove gaseous tritium in the form of T/sub 2/, HT and CH/sub 3/T through oxidation with precious metal/alumina catalyst followed by adsorption in zeolite pellets. The present paper reports the results of air cleanup experiments of atmosphere in a glove box by using hydrogen tritide and the HT-to-HTO factional conversions determined under various conditions of catalyst temperature and the gas flow rate.

25125 **New process to remove tritium from glove box atmospheres.** Weichselgartner, H. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1169-1172(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The best existing tritium absorption system will remove tritium to a level of about 5 x 10-/sup 5/ Ci/m/sup 3/. Besides the catalyst bed and the molecular sieve column some more components, like blower, heater, cooler, preheater and heat exchangers must be installed in a tritium absorption unit. The new process reduces the number of components significantly. Only one reation column, a circulation pump and a blower are necessary but no heating devices. The process is based on catalytic hydrogenation of liquid organic components, such as linolenic acid. The process was investigated by a laboratory test apparatus which was doped with 2 ml of hydrogen (corresponding to 5 Ci of tritium). Within 70 minutes, the amount of hydrogen was reduced to 0.15 ml (approximately 0.4 Ci).

25126 **Status of physical data on tritium and its behavior in fusion related systems.** Burger, L.L.; Morgan, L.G. (Battelle, Pac Northwest Lab, Richland, WA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1196-1199(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The literature on 'tritium properties' was surveyed up to 1980 and evaluated. The study includes physical properties, exchange reactions, and solubility, permeability, and diffusion. The present status is given for systems of interest in fusion research. Selected examples illustrate the quality and quantity of the data. Recommendations are made for further work.

25127 **In-situ tritium recovery from Li/sub 17/Pb/sub 83/ breeding blanket.** Sze, D.K. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1213-1216(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Li/sub 17/Pb/sub 83/ is an attractive breeding material due to its high tritium breeding potential, low tritium solubility and relative inertness toward water. The University of Wisconsin Fusion Engineering Program in conjunction with the Stellarator/Torsatron Lab has addressed some of the key technical issues of stellarator/torsatron power reactors. As a result of these deliberations, a point reactor design called UWTOR-M has evolved. This paper discusses the blanket design concept and in particular the tritium recovery aspect of this blanket design.

25128 **Fast shutter valve for TFTR neutral beam lines.** Wright, K.E.; Clemens, F. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1402-1405(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A Prototype FSV has been designed, fabricated and tested. Results show a conductance in the range of 20 to 30 liters/sec with translation times <120 msec. for 7000 cycles and /similar/300 msec, for a total of 20,000 cycles. Translation times of 60 to 70 msec. can be achieved.

25129 **Development of tritium technology for the magnetic fusion energy program.** Anderson, J.L. (Los Alamos Natl Lab, NM, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2066(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The use of the radioactive hydrogen isotope of mass three (tritium) as a fuel component in fusion reactors introduces several possible problem areas in reactor design. The primary fusion reactors in a D-T plasma is the T(D,n)/sub 4/He reaction with an energy release of approximately 17.5, nMeV. Fuel is bred in fusion reactors and the bred fuel must be removed efficiently from the blanket. A second area of lithium technology is that of fuel reprocessing. Other special problems introduced by tritium are related to radiation damage and chemical compatibility of materials used in tritium facilities. This paper briefly describes the current status of tritium technology in each of these areas.

25130 **Developments in the fuel cleanup system for the tritium system test assembly.** Bartlit, J.R.; Carlson, R.V.; Walthers, C.R. (Los Alamos Natl Lab, NM, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2084-2087(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Fuel Cleanup System is used to remove impurities from the simulated fusion fuel stream at the Tritium Systems Test Assembly (TSTA) Los Alamos National Laboratory. A total of five activated metal beds will be used at different operating temperatures (as high as 1170 K) for various imposed by properties of construction materials at high temperature -- properties such as low strength, the formation of low-melting eutectics with uranium, and

high permeability for tritium. The development and testing and bed designs, to avoid these problems are described.

25131 **Properties of yttrium sorbers which improve tritium sorption rate from liquid lithium.** Fischer, P.W.; Talbot, J.B.; Clinton, S.D.; Rogers, F.L.; Watson, J.S. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 2094-2097(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Tritium inventory in and fusion reactor blanket must be kept low (less than a few kg) so that the reactor can supply its own fuel after a reasonable period of operation (i.e., before external sources of tritium are exhausted. To achieve this, the tritium concentration in the breeding material must be kept low, typically <10 ppm. Liquid lithium continues to be one of the most likely tritium breeding materials. Sorption of tritium from lithium by yttrium metal getters has the demonstrated capability for reducing the tritium concentration to >1 ppm at acceptable rates. To evaluate the performance of different yttrium samples, mathematical analysis of the system was developed to determine sorber diffusivity system was developed to determine sorber diffusivities. The purpose of this paper is to outline the mathematical analysis, report results of the analysis for previous sorption experiments, and present predictions of the model.

25132 **Prospects of energy transformation between fusion reactor and OTEC plant.** Denno, K. (NJ Inst of Technol, Newark, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 950-953(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper presents conceptual feasibility criteria for the coupling of an off-shore nuclear fusion reactor to OTEC plantship. The mode of connection is by cooling oceanic region to a significant temperature gradient enhancing the extraction of Thermal energy. Criteria have been developed for the rate of heat transfer from the reactor main zone as well as from the exhaust diverted plasma. Induced temperature effects on the exhaust plasma are expressed along with stability relationships for the rate of heat transfer to OTEC energy conversion components, by evaporator and condenser systems.

25133 **Design and cost of the TFTR power conversion system.** Cassel, R.L. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1435-1437(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper presents an overview of the TFTR power conversion system in terms of the cost and some unique design features employed in the conversion system to match the performance requirements of the tokamak within the budgetary and cost restraints allocated for the system.

25134 **Direct energy converter for UW tandem mirror reactor.** Yang, T.F.; Maurer, W. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1813-1816(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In a Tandem mirror reactor, the end loss ions can be preferentially leaked out one end and hot electrons out the other. A single stage regular Plasma Direct Convertor (PDC) at the ion end to recover the ion power and a simple thermal dump at the electron end were considered by the reactor design team at LLL. Such a convertor has the net efficiency of 64% and would be as high as 77% if the 3.5 MeV /alpha/-particles can be recovered, which is the largest single loss. Another large loss is due to energy spread. A very important question, the neutron steaming out the ends, was not addressed in that design. In this study, an attempt was made to find solutions to these problems.

25135 **Transport of light ion beams in plasma channels.** Olsen, J.N. (Sandia Natl Lab, Albuquerque, NM, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 660-663(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Intense beams of light ions are being transported over distance of 1-2 meters in plasma channels in progress toward inertial confinement fusion driven by particle beams. This paper reports experimental work at Sandia Labs, Where ions have propagated in wire-initiated and laser-initiated discharge channels. Particular emphasis is given to studies of laser initiation and channel stability.

25136 **Preliminary conceptual design and engineering aspects of a light ion fusion target development facility (TDF).** Cook, D.L. (Sandia Natl Lab, Albuquerque, NM, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 664-667(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

If inertial confinement fusion can be demonstrated at reasonable levels of driver power and energy, development of targets for a host of inertial fusion applications will be necessary. Engineering aspects and design issues of a facility dedicated to this purpose, a Target Development Facility (TDF) using light ion beams as the driver, have been explored in a preliminary conceptual design. In this paper, the nature of the facility and results of the preliminary design are discussed.

25137 **High target gain to ICF reactor - a problem of repetition.** Moses, G.A. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 673-675(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The near term goal of the inertial confinement fusion (ICF) program in the United States is the demonstration of high target gain, where the thermonuclear energy released from the ICF target exceeds the driver energy input to the target by roughly a factor of one hundred or more. This paper briefly reviews the most notable published ICF conceptual reactor designs and then focuses on the engineering problems of commercial ICF reactors with emphasis on the problems associated with the high repetition frequency inherent in such systems.

25138 **Gas dynamics and heat transfer phenomena in liquid metal ICF reactor first surfaces.** Peterson, R.R.; Sze, D.K.; Hassanein, A.M.; Pong, L. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 680-683(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The INPORT concept of first surface protection in ICF reactors is discussed in the context of a heavy ion beam reactor. Porous SiC tubes bathed in liquid Pb/sub 83/Li/sub 17/ lose a layer of film to X-ray evaporization. The dynamics of this vaporized film's consequent radiation of energy back to the tubes, condensation and reevaporization are studied in detail. The presence of this vapor is found to not degrade the overall performance of the reactor.

25139 **Development of the rf linear accelerator test bed for heavy ion fusion.** Watson, J.M. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 684-687(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The amount of absorbed energy required by high gain deuterium-tritium targets for inertial confinement fusion reactors is now projected to be greater than 1 megajoule. At these energy levels, the concept of small, dispersed power plants is no longer viable. This leads to the use of large power centers which exploit every means of maximizing output power versus capital cost. It has become apparent that a heavy ion fusion driver is the preferred choice in this scenario. To demonstrate this accelerator-based option, the national program has established two test beds: one at

Argonne for the rf linac/storage ring approach, and one at Lawrence Berkeley Laboratory developing and induction linac. The Argonne Beam Development Facility (BDF) would consist of a 40 mA RF linac for Xe+/sup 8/ , a storage ring, and a 10 GeV synchrotron. One of the most important aspects of the BDF program is the control of beam quality throughout linac acceleration, stripping to higher charge states, funneling of multiple beams, and frequency transitions. The design and status of the BDF is described as well as future program options to demonstrate as many solutions as possible of the issues involved in this approach.

25140 **Nova laser system for inertial confinement fusion.** Simmons, W.W.; Godwin, R.O.; Hagen, W.F.; Holzrichter, J.F.; Levy, A.J.; Trenholme, J.B. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1221-1224(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Nova laser fusion research facility, currently under construction at LLNL, and authorized by Congress at /195M, will provide researchers with powerful new tools for the study of nuclear weapons physics and inertial confinement fusion. Nova is a large, solid state laser, generating a fundamental wavelength of 1.0 /mu/ m, intended to deliver 200-300 kJ in a few nanoseconds to appropriate advanced inertially confined fusion targets containing deuterium and tritium. The Department of Energy has approved construction of ten Nova Laser beams and the associated laboratory buildings. The remaining ten beams, and harmonic conversion apparatus, are presently under consideration.

25141 **Nova mechanical systems.** Hurley, C.A.; Bradley, G.; Frick, F. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1225-1228(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper discusses the mechanical design features of large glass laser components, such as power amplifiers, spatial filters, Faraday rotators, turning mirrors, stable support systems and the integration of these components into a total system. The Nova system consists of ten laser beam lines with an output aperture for each beam of 74 cm.

25142 **Optical components for the Nova laser.** Wallerstein, E.P.; Baker, P.C.; Brown, N.J. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1229-1233(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Although assembly of the first two beams of Nova is just commencing, the optical production, including construction of the special facilities required for many of the components, has been underway for over three years, and many phases of the optical manufacturing program for the first 10 beams will be completed within the next two years. On the other hand, new requirements for second and third harmonic generation have created the need to initiate new research and development. This work has been accomplished through the enormous cooperation DOE/LLNL has received from commercial industry on this project.

25143 **Nova power systems and energy storage - 1.** Whitham, K.; Merritt, B.T.; Holloway, R.; Gritton, D.G.; Oicles, J.A. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1234-1237(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Nova Power System has been designed to meet several simultaneous goals: performance, cost, reliability and noise reduction. The approach has been to improve on known performance from the Shiva System and to thoroughly test each design under actual operating conditions. Subsystems have met their individual requirements in various tests. Most parts are on order in quantities for the first half of the Nova System.

25144 **Nova power systems and energy storage - 2.** Whitham, K.; Merritt, B.T.; Holloway, R.; Gritton, D.G.; Oicles, J.A. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1238-1240(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

To charge the Nova bank within 30 seconds as required for adequate bank lifetime, 25 to 30 MVA of dc power must be applied to the bank. Large substation sized power supplies have been designed to supply this much power at an efficient cost. Smaller, Shiva-type, 100 KVA supplies will be used to charge the modules for the rod amplifiers and rotators, but most of the bank will be charged by 12 large supplies (plus one spare) located in the substation areas outside the Nova Lab Building. All of these supplies are designed as three-phase voltage doublers. Each large supply is capable of charging 12 MJ of capacitors to 22 kV in thirty seconds. They are powered via a fused disconnect from the 13.8 kV ac power mains, and draw approximately 2.0 MVA peak power.

25145 **Nova front end subsystem.** Murray, J.E.; Kuizenga, D.J.; Downs, D.C. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1241-1243(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The NOVA front end is designed to provide highly reliable input pulses for each of the 20 amplifier chains with adequate drive and flexibility to provide all the required output variations of the total NOVA laser.

25146 **Nova alignment and laser diagnostics systems - 1.** Bliss, E.S.; Ozarski, R.G.; Myers, D.W.; Richards, J.B.; Swift, C.D.; Boyd, R.D.; Hugenberger, R.E.; Seppala, L.G.; Parker, J.; Dryden, E.H. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1244-1247(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The alignment and laser diagnostic systems guide laser pulses through the separate amplifier chains to the target, measure their temporal, spatial and energy characteristics, and ensure simultaneous arrival at the target to within 5 picoseconds. Alignment tasks accomplished prior to each target shot involve automatic or remote-manual adjustments of approximately 2000 stepper motors and other actuators for the full 20 beam, 3 wavelength system. The primary detectors for alignment functions are CCD cameras with both digital and standard video output. Diagnostic data handling and processing is accomplished digitally, and both the alignment and diagnostic systems are integrated into the facility-wide digital control network.

25147 **Nova alignment and laser diagnostics systems - 2.** Bliss, E.S.; Ozarski, R.G.; Myers, D.W.; Richards, J.B.; Swift, C.D.; Boyd, R.D.; Hugenberger, R.E.; Seppala, L.G.; Parker, J.; Dryden, E.H. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1248-1251(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Requirements for diagnostic-data acquisition and processing include rapid turnaround, effective interfacing with the alignment and power-conditioning controls, preservation of data under failure conditions, options for local or control-room modes of operation, and portability of the hardware required for off-line troubleshooting and calibration. The major elements of a digital system which meets these requirements are shown. A further potential difficulty, operating in the presence of prompt radiation from the target, has been avoided by locating all laser diagnostic components outside of the target room.

25148 **Nova frequency conversion system.** Summers, M.A.; Seppala, L.G.; Rienecker, F.; Eimerl, D.; Johnson, B.C. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1252-1256(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Frequency conversion of ND:glass lasers by harmonic generation is routinely used for generating intense visible and ultraviolet light. This article describes plans for implementation of harmonic generation on the Nova laser. The basic concept, scaling to large aperture and integration with the alignment and diagnostic systems are discussed. In addition, the multi-wavelength target focusing system is described.

25149 **Nova target systems.** Rienecker, F. Jr.; Field, J.E.; Williams, J.D.; Summers, M.A.; Singh, M.S.; Severyn, J.R.; Kane, J.F.; Dickinson, R.A.; Barna, E.A. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1257-1260(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper includes descriptions of the target chamber, beam-focusing lenses and positioners, the target support and alignment structure, target diagnostics, and control of the radiation environment.

25150 **Laser sequencing, synchronization, and safety systems.** Gritton, D.G.; Oicles, J.A.; Berbigler, L.W.; De Groot, A.J.; Smart, J.A.; Morton, J.W.; Christie, D.J. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1261-1264(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An overview is presented of the sequencing of Nova operations leading up to propagation of the optical pulse. Control techniques include check-lists, computer controlled sequencing, programmable logic timers and oscillator electronics. Ensuring personnel safety during laser operation is a safety interlock system which is designed to be both independent and compatible with the laser control systems.

25151 **Nova control system - goals, architecture, and central system design.** Suski, G.J.; Holloway, F.W.; Duffy, J.M.; Krammen, J.E.; Humphreys, C.A.; McGuigan, D.L.; Wilkerson, J.L.; Zaragoza, G.J. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1265-1269(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Control and data acquisition functions for the Nova Laser and Target Irradiation facility are performed by a distributed, hierarchically organized, network of computers and devices interconnected through high speed fiber optic communication links. The architecture established for this control system provides the flexibility within each of its fundamental subsystems (power Conditioning, Alignment, Laser Diagnostics and Target Diagnostics) to optimize internal design and organization according to their specific criteria. Control system integration, support of common functions, and centralization of operation are achieved using a fifth unifying subsystem called Central Controls.

25152 **Novanet, a local computer network, and Nova target data acquisition system.** Severyn, J.R.; Van Arsdall, P.J.; Calliger, R.J.; Demaret, R.D.; Hill, J.R.; Kroepfl, D.J.; Reed, R.K.; Ruddock, S.M.; Schaefer, W.J. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1270-1273(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This presentation covers two topics. The first is Novanet, a high speed, bit-serial, fiber-optic, distributed communication network used on the Nova laser alignment and diagnostic computer control system. Novanet provides multidrop capability between computers and remote interface devices, error detection on each data transfer, and low computer system overhead. Novanet is used on our distributed control system which includes 3 VAX 11/780 computers, approximately 50 LSI-11 processors and 15 charge coupled device (CCD) TV cameras. The second topic disscusses the Nova Target Data Acquisition and Vacuum Control System which uses CAMAC instrumentation interfaces and LSI-11 acquisition processors. Architecture, system design philosophy, control and data flow are presented.

25153 **Electron beam transport through the atmosphere in reduced-density, current-carrying channels.** Murphy, D.P.; Raleigh, M.; Laikin, E.; Greig, J.R.; Pechacek, R.E. (Jaycor, Alexandria, VA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1548-1551(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Successful propagation of an intense beam of relativistic electrons along a reduced-density, currrent-carrying channel in the atmosphere is reported. The path through the atmosphere the atmosphere is designed by laser-induced, aerosol-initiated air-breakdown using a Q-switched Nd:glass laser. The air along the path is heated by a high voltage discharge (/similar/250 kV) which is guided by the laser-produced preionization. As the hot air expands radially to form a reduced-density channel, a second lower voltage discharge (/similar/50 kV) is applied to the channel to create a B/theta/magnetic field around the channel. Intense relativitistic electron beams (REBs) injected concentrically into such channels are observed to propagate along the full length of the channel (/similar/100 cm).

25154 **Nuclear pumping of O/sub 2/(/sup 1//delta/) for laser fusion reactors.** Zediker, M.S.; Dooling, T.R.; Greenspan, E.; Miley, G.H. (Univ of Ill, Urbana, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1560-1561(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An energy balance for a nuclear Pumped Laser driven inertial confinement fusion Reactor was performed to demonstrate the feasibility of such a device. The unique feature of this system is that nuclear energy rather than electrical energy is recycled to fuel the laser for the next pellet implosion. With a nuclear pumped O/sub 2/ - OI/sub 2/ laser, a pellet gain of /similar/40 is all that is required for the system to be energy self-sufficient. These low gain requirements are indeed very attractive for an ICF reactor.

25155 **Rates of loss of material from inertial fusion reactor surfaces exposed to pellet emissions.** Pendergrass, J.H. (Los Alamos Natl Lab, NM, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1616(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

New Computer Programs for more accurate estimation of rates of material loss from inertial fusion reactor cavity surfaces have been exercised to determine economic cavity sizes for commercial-applications pellet desings. Large loss rates can contribute subtantially to maintenance and total production costs. Modern Theory, with empirical factors to force agreement with limited experimental data, is used to estimate sputtering loss rates. A computer code, HOTWALL, that treats temperature-dependent physical properties, thermal transport of deposited energy, and arbitrary energy distributions and histories estimates evaporate loss rates.

25156 **Liquid jet experiments: relevance to inertial confinement fusion reactors.** Hoffman, M.A. (Univ of Calif, Davis, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1901-1904(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In order to try to find a reactor design which offered protection against neutron damage, studies were undertaken at LLNL (the Lawrence Livermore National Laboratory) of self-healing, renewable liquid-wall reactor concepts. In conjuction with these studies, were done a seris of small-scale aer jet experiments were done over the past several years at UCD (University of California, Davis Campus) to simulate the behavior of liquid lithium (or lithium-lead) jets in these liquid-wall fusion reactor concepts. Extropolating the results of these small-scale experiments to the large-scale lithium jets, tentatively concluded that the lithium jet can be re-established after the microexplosion, and with careful design the jets should not breakup due to instabilities during the relatively quiscent period between MICROEXPLOSIONS.

25157 **EPRI fusion program and its thrust in fusion engineering.** Scott, F.R. (EPRI, Palo Alto, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 11-14(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The primary objective of EPRI's Fusion Power Systems Program is to ensure the identification, selection, and development of fusion systems that can be used by the electric utility industry. The program highlights utility-oriented issues, such as power plant size, compatibility with utility grid, and maintainability. The major thrust of DOE's program has been large (1-GW(e) fusion power plants. The development of concepts in support of small systems could improve fusion's ultimate penetration capability. To implement its goals, the EPRI program is organized into three subprograms: magnetic confinement fusion, inertial confinement fusion, and analysis and technical development.

25158 **Results of an insulator materials test program for application inside the TFTR plasma chamber.** Renman, R.E.; Sredniawski, J.J.; Trester, P.W. (Grumman Aerosp Corp, Bethpage, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 222-225(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

There are many components inside the IFTR plasma chamber (i.e., bellows covers, bumper limiters, and surface pumps) that require dielectric materials to break up eddy currents caused by plasma disruption. These dielectrics must withstand elevated temperatures and yet be compatible with high-vacuum conditions. Evaluations have been performed under the TFTR upgrade effort to find dielectric materials that are suitable for use as insulators within a Tokamak. After an extensive search, several types of polyimides and inorganic bonded mica were identified as candidates and selected for test. This paper summarizes test results and describes the manner in which they are being used to evaluate candidate insulator design concepts.

25159 **Limiter, of dense and high thermal conducting material, for a fusion reactor.** Bogensberger, H.G.; Schmidt-Hansberg, Th.; Schoenfeld, R. (NUKEM, Hanau, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 236-238(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The work performed at the NUKEM laboratories proved that the production of dense and high thermal conducting limiter tiles is possible in principle. Some experiments, concerning the thermo shock resistivity, showed no failure of the material due to cracks or peeling. Before starting manufacture on a large scale however, several steps in the production have to be optimized to ensure a proper quality of the material. Use of graphite on a limiter material is recommended.

25160 **Fatigue testing of TFTR vacuum vessel bellows.** Rappe, G.H.; Brown, G.; Perry, E.D. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 240-243(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The T.F.T.R. Vacuum Vessel is made up of ten segments which in turn are bolted and welded together to form a complete torus. For various design reasons these segments or rigid sectors are not identical, but vary in shape and configuration of the component parts. The fourteen bellows are installed in locations which facilitate segmentation of the torus if this becomes necessary due to some mishap to the vacuum vessel, or should one of the toroidal field coils develop a fault. The integrity of the vacuum, and the ability to develop and maintain a plasma within the torus depends upon the quality of these bellows, therefore it was decided to perform a series of fatigue tests to experimentally verify that the design was adequate for the continued operation of T.F.T.R. This paper describes the tests already performed, a description of the test fixture and tests planned for the future.

25161 **Initial thermal outgassing properties of aluminium between 20/degree/c and 320/degree/c.** Reiter, F.; Camposilvan, J. (Comm of the Eur Communities, Ispra, Italy). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 244-247(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Initial thermal outgassing properties are important during the start-up phase and during the operation phase of thermonuclear fusion reactors. The equilibrium surface coverage determines the contamination of the fuel gas during the start-up phase, the equilibrium outgassing rate determines the contamination by surface outgassing during reactor operation. The experimental investigations are presented and equilibrium surface coverages have been calculated from these results.

25162 **Thermal and mechanical testings of TiC and TiN coating materials with Mo substrates.** Gomay, Y.; Koizumi, H.; Ishihara, H. (Toshiba Corp, Kawasaki, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 248-251(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Thermal and Mechanical characteristics of TiC and TiN coating materials with Mo substrates are reported. The coating method applied is chemical vapor deposition. In the case of TiC coating, thin TiN layers were coated before TiC coating to avoid formation of molybdenum carbide during TiC coating. thermal testing by electron beam showed that both the TiC-TiN and TiN coating layers survived without observable erosion till the substrates were melted.

25163 **Electron assisted methane production on carbon surfaces.** Auciello, O.; Haasz, A.A.; Stangeby, P.C.; Underhill, P.R. (Univ of Toronto, Ont, Can). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 252-254(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Results are reported on the production of methane due to electron bombardment or electron plus atomic hydrogen/deuterium bombardment of technical grade and crystalline graphite. It was found that both graphites gave very high methane yields, after mild baking, due to electron impact only with or without simultaneous atomic bombardment. The origin of this methane is evidently hydrogen or hydrogen-containing compounds already in the graphite or on the surface. After a very strong baking of the technical grade graphite and moderate baking of the crystalline graphite, the methane yield, under electron impact only, was greatly reduced to a residual level. When such strongly degassed graphite was exposed to simultaneous electron and atomic bombardment, a small electron/gas atomic hydrogen/graphite synergistic production of methane was observed. The present work is aimed at further elucidating this synergistic effect and at identifying the origin of the hydrogen causing the formation of CH/sub 4/.

25164 **Fatigue data of molybdenum.** Kimishima, T.; Sukekawa, M.; Owada, K.; Shimizu, M.; Nakamura, H.; Masuda, M. (Hitachi Ltd, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 255-258(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The first walls of JT-60 are determined to be pure molybdenum, but information is lacking on mechanical properties of molybdenum, especially the data of fatigue strength at high temperature. This study performs the low cycle fatigue test at high temperature. According to the results, the first walls have no serious problem with respect to the fatigue life.

25165 **Plasma engineering considerations for an inside-barrier tandem mirror test facility.** Santarius, J.F.; Emmert, G.A. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 483-486(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The effects of technology limitations on the design of a tandem mirror, aimed at testing materials and pertinent reactor technology on a 1990's time scale, are presented. Parameters for a reference case device and parametric variation of some important quantities are exhibited. Particularly important considerations are magnetic field limits, neutral beam injection angles, ECRH and ICRH systems, alpha particle removal, fueling, and stability criterion.

25166 **Redeposition of the sputtered surface in limiters.** Brooks, J.N.; McGrath, R.T. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 495-498(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Erosion of the surface coating of a pumped limiter by sputtering may be a critical life-limiting issue for future tokamak reactors. Redeposition of the sputtered material, however, may extend the coating life significantly. This subject has now been studied through the use of a code which models the redeposition of sputtered material which gets ionized in the scrape-off lyer. The studies were made for 'high flux' and 'low flux' edge conditions corresponding to FED and STARFIRE limiters and assumed plasma-edge parameters. The results indicate that substantial redeposition from the scrape-off layer ionized neutrals occurs in the cases considered.

25167 **Plasma control techniques of the ASDEX feedback system.** Schneider, F. (Max-Planck-Inst fuer Plasmaphys, Garching, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 503-506(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In the ASDEX tokamak the shots are exactly preprogrammed and most of the disturbances are reproducible. So a computer can learn from one shot how to correct the next one. With this sort of disturbance feedforward one can also introduce a 'negative delay' in the program to compensate even fast and strong disturbances withous unwanted overswing or oscillations. The feedforward in conjunction with feedback control allows production of a magnetically limited plasma from the very beginning without any wall or limiter contact. This is a reason why in ASDEX the loop voltage on breakdown can be as low as 5 V/sup 2/. The plasma column can be controlled in the vacuum vessel even after disruptions have occurred.

25168 **Status of Doublet III data archival and retrieval system.** Shephard, G.W.; Karin, S. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 601-603(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Doublet III Data Archival and Retrieval System was written to provide both data archival and data access functions for the General Atomic Company large-scale fusion device, Doublet III. This large tokamak nominally generates two million bytes of data every five minutes, 14 hours per day during operation. A typical five-day week produces between 600 and 1200 megabytes of data to be archived. At present, over 20,000 shots are in the archival system, a total of approximately 40 Gigabytes. The development and evolution of this system is discussed in three parts: current status, history of the system, and future plans.

25169 **Data collection system for a tokamak fusion experiment.** Huckins, R.; Roberts, D.; Ryan, H. (Nucl Data Inc, Schaumburg, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 604-607(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Nuclear Data Extended List Acquisition System has been in use since June, 1980, at the ASDEX fusion experiment, Max Planck Institute for Plasma Physics, Garching, West Germany. The system records the soft x-ray radiation produced by the plasma. The data is generally processed into multiple time-scaled PHA spectra, from which plasma density, temperature, and impurities can be determined for various times and locations. The system was designed around standard PHA computer components into a versatile, expandable high-speed acquisition system. This paper describes the basic architecture and operation of the system, and various modifications in progress which adapt it to changing experimental requirements.

25170 **Diagnostic timing system for the TMX-Upgrade.** Bell, H.H. Jr.; Coutts, G.W.; Hinz, A.F. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 608-610(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This system provides trigger signals at various times and clock signals at various frequencies for the CAMAC transient recorders of the plasma diagnostics system for the TMX-Upgrade. The timing system is designed so that all clocks are in fixed-phase relation to their corresponding triggers and to each other. Therefore, data recorded from the different diagnostics can be directly time compared. Trigger signals can be generated in 100-ns increments, with an uncertainty of 500 ps. The clock signals have a time uncertainty of less than 1 ns. The system is arranged so that these accuracies are maintained over the entire diagnostic room. The timing system is modular and uses mostly digital delay generators, signal fan outs, and frequency dividers.

25171 **Analysis and design of a pumped-limiter impurity-control system for EBTR.** Driemeyer, D.E.; Stones, P.B.; Krakowski, R.A. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 696-699(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Pumped-limiter impurity-control concepts have recently gained interest in the tokamak community, primarily as a result of encouraging experimental measurements of particle removal by pumped-limiter configurations together with the reduced impact, relative to magnetic divertors, that pumped limiters have on the overall system complexity and cost. The characteristics also apply to the EBT where the close coupling of plasma transport, magnetic topology, and the electron rings give added impetus to assessing a nonmagnetic impurity control system. This paper discusses physics, engineering, and design considerations associated with the incorporation of a pumped limiter system in an EBT reactor. Models which have been developed to describe the interplay between the limiter, the plasma, and other reactor subsystems such as those for vacuum pumping and limiter/first wall cooling are presented along with a brief description of the resulting EBTR limiter configuration.

25172 **Physical sputtering code for fusion applications.** Smith, D.L.; Brooks, J.N.; Post, D.E.; Heifetz, D.B. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 719-722(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A computer code, DSPUT, has been developed to compute the physical sputtering yields for various plasma particles incident on candidate fusion reactor first-wall materials. The code, which incorporates the energy and angular-dependence of the sputtering yield, treats both high-and low-Z wall materials. The physical sputtering yield is expressed in terms of the atomic and mass numbers of the incident and target atoms, the surface binding energy of the wall materials, and the incident angle and energy of the particle. An auxiliary code has been written to provide sputtering yields for a Maxwellian-averaged incident particle flux. The code DSPUT has been used as part of a Monte Carlo code for analyzing plasma-wall interactions.

25173 **Conceptual design of the INTOR first wall system.** Smith, D.L.; Majumdar, S.; Mattas, R.F.; Turner, L.; Jung, J.; Abdou, M.A. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 723-727(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The design concept and performance characteristics of the first wall design for the phase-1 INTOR (International Tokamak Reactor) study is described. The reference design consists of a water-cooled stainless steel panel. The major uncertainty regarding the performance of the bare stainless steel wall relates to the response of a thin melt layer predicted to form on limited regions during a plasma disruption. A more complex backup design, which incorporates radiatively cooled graphite tiles on the inboard wall, is briefly described.

25174 **U.S. INTOR divertor design.** Mattas, R.F.; Abdou, M.A.; Brooks, J.N.; Gohar, Y.; Misra, B.; Smith, D.L.M.; Bowers, D.; Delaney, M.; Grewing, C.O.; Morgan, G.D. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 728-731(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The impurity control system in INTOR is a single null poloidal divertor. The total power to the divertor is 80 MW, primarily in the form of ionized particles that have escaped from the plasma. The ionized particles strike the divertor collector plates, resulting in high surface heating and sputtering that limits the lifetime to approximately 2 yr. This short lifetime means that the plates must be replaced several times during the reactor life, and, therefore, the divertor module has been designed to be replaced independently of the other reactor components. The divertor collector plates have been analyzed in detail, and the results of thermal and stress calculations are presented.

25175 **INTOR radiation shielding for personnel access.** Gohar, Y.; Abdou, M.A. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 740-743(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Since penetration shield significantly affects reactor cost, personnel access, and reactor availability, elaborate three-dimensional radiation calculations for the whole reactor system, including the neutral beams, divertor system, toroidal field coils, and reactor building liner, were carried out. The general-purpose Monte Carlo code MCNP was used for the calculations with a continuous energy representation for the nuclear cross section from ENDF/B-IV. The INTOR reactor shield system consists of the blanket, bulk shield, penetration shield, component shield, and biological shield. The bulk shield consists of two parts: (a) the inboard shield; and (b) the outboard shield.

25176 **Experience from the implementation of a control- and data acquisition system for the tokamak TEXTOR.** Bohn, F.H.; Halling, H. (Kernforschungsanlage Juelich, Ger). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 880-883(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A modular and distributed control and data acquisition system, including also such system components which had been successfully operated elsewhere, has been designed and implemented for the TOKAMAK TEXTOR. The present paper concentrates on experiences gained during the evolution of the TEXTOR control and data acquisition system, in particular the selection of system components, system structuring, software management, final integration and operation. The applied solutions are described. The effort in terms of time and cost has been analyzed and is discussed, aiming for an assessment of the required effort for future systems. Finally the system is discussed on the basis of the practical experiences gained during its use especially for the start-up phase of TEXTOR.

25177 **System design of ZENKEI, the central control system for JT-60.** Suzuki, Y.; Kondo, I.; Ogata, A.; Kimura, T.; Hatakeyama, T.; Murai, K.; Iba, D. (Jpn At Energy Res Inst, Tokai). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 884-886(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The ZENKEI, the central control system of the JT-60, supervises various control subsystems and maintains harmonious operation of subsystems under plasma discharging. It has the following three main roles: (1) Supervisory control of the JT-60, (2) Safety interlocks for the JT-60, (3) Realtime control for the JT-60. This paper gives a brief description of the system structure and its functions, especially that of plasma discharging control as the consequence of the most recent designings.

25178 **Device configuration management system.** Nowell, D.M. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 890-893(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Fusion Chamber System, a major component of the Magnetic Fusion Test Facility, contains several hundred devices which report status to the Supervisory Control and Diagnostic System for control and monitoring purposes. To manage the large number and diversity of devices represented, a device configuration management system was required and developed, key components of this software tool include the MFTF Data Base; a configuration editor; and a tree structure defining the relationships between the subsystem devices. This paper will describe how the configuration system easily accommodates recognizing new devices, restructuring existing devices, and modifying device profile information.

25179 **Design concept of real-time plasma control for JT-60.** Hosogane, N.; Yoshino, R.; Kurihara, K.; Kimura, T.; Ogata, A.; Yonekawa, I.; Aikawa, H.; Kondo, I.; Suzuki, Y. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 904-907(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The real-time system of the JT-60 has a cascade structure with the major and the minor control loops. The multi-variable feedback control is adopted in the major control loop in order to adjust non-linear effects which will appear in the high-/beta/region. By applying the concept of 'phase shift control' to the control program of the major control loop, a flexible tokamak discharge control is expected to be performed with taking account of machine protection.

25180 **Optimization of sequential control in operation of fusion device.** Kimura, T.; Ogata, A. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 908-912(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A computer code for finding optimum sequence of operation of a fusion device is developed. The dynamic programming technique is adopted for optimization of the sequence control. An estimate of the necessary number of steps and cost is made for a case

of the evacuation process of the vacuum vessel. The parallel operation of two or more machines are considered.

25181 **Experimental study on feedback control system of plasma position.** Abe, M.; Otsuka, M.; Nishi, M.; Kanamori, T.; Kobayashi, T.; Uchikawa, S. (Hitachi Ltd, Ibaraki, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 916-919(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Performance of the feedback control system for the horizontal plasma position in the small shell-less tokamak, HT-1, has been studied numerically and experimentally. Emphasis was put on verifying the validity of coupling parameter evaluation methods for poloidal field coils and structures such as the vaccum vessel and the transformer iron core. The effect of the iron core on the poloidal field distribution was analyzed numerically. Mutual inductances between poloidal field coils and structures were obtained from the calculated eddy currents. Using these calculated parameters, the indicial response of the feedback control loop was studied analytically. Good agreement between calculations and experiments was obtained.

25182 **Control and data acquisition systems for the S-1 spheromak.** Woolley, R.D. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 924-927(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper discusses present plans and describes requirements for S-1 operating controls and data acquisition systems. The plans cell for implementation of these functions in separate computer and CAMAC systems, strongly coupled to one another via a CAMAC interface. Detailed design is still in progress on several subsystems which will be operated or monitored by S-1 operating controls; thus, the description herein is somewhat preliminary, is subject to change, and probably will require updating one year hence.

25183 **PDX operating controls.** Mathe, P.; Robertson, R.; Woolley, R.D. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 928-931(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Poloidal Divertor experiment began operation in November 1978. Some of the operating controls were in working condition a year before that date for power tests. In fact, a very similar system to the one used for PDX operated the FM-1 experiment as early as 1971. The functional block diagram of the PDX operating controls is shown. The operating console provides the man-machine interface during the experiment. Most status lights and pushbotton controls are directly interfaced to the IBM 1800 computer. This computer in conjunction with an IPC-300 programmable controller and a CAMAC serial highway system, performs the supervisory and control functions associated with the various PDX subsystems.

25184 **TFTR diagnostic vacuum controller.** Olsen, D.; Persons, R. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 932-935(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TFTR diagnostic vacuum controller (DVC) provides in conjunction with the Central Instrumentation Control and Data Acquisition System (CICADA), control and monitoring for the pumps, valves and gauges associated with each individual diagnostic vacuum system. There will be approximately 50 systems on TFTR. Two standard versions of the controller (A and B) wil be provided in order to meet the requirements of two diagnostic manifold arrangements. All pump and valve sequencing, as well as protection features, will be implemented by the controller.

25185 **PDX diagnostic control system.** Mika, R. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 936-940(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes a computer-base diagnostic control system operating on the PDX Tokamak. The prime function of the system is to control mechanical positioning devices associated with various diagnostics including Thomson Scattering, X-Ray Pulse Height Analyzer, Rotating Scanning Monochromator, Fast Ion Detection Experiment, Bolometers and Plasma Limiters. The diagnostic control system consists of a PDP-11/34 computer, a CAMAC system partitioned between the PDX control room and the PDX machine area, and special electronic control modules developed at PPL. The special modules include a digital closed loop motor controller and user interface control panel for control and status display. A standard control panel was developed for interfacing each system user with the PDP-11/34 computer, through specially developed CAMAC modules.

25186 **Software requirements of the central control system computer for the TEXT tokamak.** Terry, D.R.; Dietz, T.E.; MacMahon, A.B.; Hutchins, H.S. (Univ of Tex, Austin, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 954-957(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Central Control System computer for the Texas Experimental Tokamak (TEXT) serves as the primary operator interface to the Central Control System. It is used to monitor and display control-system status and allows rapid programing of the digital 'shot' sequencing timers and microprocessors-based analog pulse generators and data logger systems. The computer is used for operator displays and 'shot' parameter editing functions, operator command entry functions, and charging and firing cycle initialization functions. Maintenance of reference 'shot' parameters and analog pulse generator waveform data is also accomplished using the computer. The analog pulse generator and data logger systems contain adequate RAM for both application program and data for one 'shot', as well as the firmware necessary for communication with the control system computer. The control system computer loads these systems with data and applications programs before each 'shot'. The implementation of these system functions is discussed.

25187 **Digitally controlled twelve-pulse firing generator.** Berde, D.; Ferrara, A.A. (Grumman Aerosp Corp, Bethpage, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 969-972(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Control System Studies for the Tokamak Fusion Test Reactor (TFTR) indicate that accurate thyristor firing in the AC-to-DC conversion system is required in order to achieve good regulation of the various field currents. Rapid update and exact firing angle control are required to avoid instabilities, large eddy currents, or parasitic oscillations. The Prototype Firing Generator was designed to satisfy these requirements. To achieve the required /plus or minus/0.77/degree/firing accuracy, a three-phase-locked loop reference was designed; otherwise, the Firing Generator employs digital circuitry. The unit, housed in a standard CAMAC crate, operates under microcomputer control. Functions are performed under program control, which resides in nonvolatile read-only memory. Communication with CICADA control system is provided via an 11-bit parallel interface.

25188 **CAMAC-based interlock system for power supply hardware protection on MFTF.** Straunch, M.S. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 989-992(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In keeping with the CAMAC-based local control and instrumentation scheme developed for MFTF, a CAMAC module with support has been designed and developed for power supply protection on MFTF. Incorporated in a CAMAC module, these tech-

niques provide a very reliable, modular and flexible interlock approach.

25189 **Low noise, high impedance, dc coupled auto zeroing amplifier for TFTR.** Marsala, R.J. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 993-996(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The requirements, design, and test results of a low noise amplifier, used to amplify signals from a wideband liquid helium cooled indium antimonide (InSb) detector used to measure the electron temperature profile in TFTR, are described. Detector resistance changes are monitored by passing a constant current through the detector and measuring the voltage across the detector. The amplifier is comprised of two separate sections. The dc coupled section consists of a low noise non-inverting amplifier with a gain of 1000 and an auto-zero feedback loop. The ac coupled section consists of an ultra low noise amplifier comprised of a multiple FET input stage followed by a low noise operational amplifier.

25190 **TFTR structural instrumentation.** Brown, G.M. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 997-999(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The structural instrumentation of TFTR is primarily designed to provide response data during initial system operation. This information will be used in the verification of design specifications and in the determination of machine operating levels. Raidation hardness and measurements under plasma disruption conditions are not included in the test specifications. In those regions where relatively high stresses occur during disruptions, and where strain gages have been installed; signal conditioning under development at present, will be installed.

25191 **Small CAMAC-based data acquisition system.** Brown, G.M. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1000-1002(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In most research laboratories, it is desirable to have available in a general purpose and easily utilized data acquisition, reduction and display system (DAS). A central system is usually utilized for large experiments however, a dedicated system is often more convenient for smaller applications. A relatively simple and inexpensive DAS is discussed, based on CAMAC modules and an 8 bit microprocessor. This system is fully CAMAC compatible and could be easily connected to a central system data highway, using an auxiliary crate controller.

25192 **Data acquisition system of TFR tokamak experiment.** Breton, J.; Cohen, A.; Hennion, F.; Idmtal, J.; Touche, J. (CEA, Fontenay-aux-Roses, Fr). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1015-1017(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The data acquisition system for the TFR experiment has been in operation since 1973. This system allows to store the shots on disks and on magnetic tapes and to display, immediately after each shot, the main parameters of the plasma : plasma current evolution, plasma displacements, loop voltage, electronic density, electron and ion temperatures. A new system composed of two Solar minicomputers, from the SEMS French company, connected to a large capacity disk is described. The great versatility and reliability of this system has been emphasized, and main effort is devoted in this area, in order to meet the two dominant requirements of an experiment such as TFR : permanent evolution and complexity of the diagnostics.

25193 **High speed digital data acquisition system on Alcator.** Besen, P.D.; Grearson, P.D. (MIT, Cambridge, MA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1018-1021(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper deals with a data acquisition system currently under development at the MIT Plasma Fusion Center, for use by the Alcator experiment. It explains the motivation for such a system and outlines the design considerations formulated for the system. The system is CAMAC based, and consists of both standard (off the shelf) and in-house developed hardware. The major components include dedicated display stations, crate based display controllers, CAMAC serial highway hardware and the CAMAC BASED acquisition hardware. One of the major advantages of this system is the ability to process and display raw data from recently completed shots without the intervention of the Alcator central computer facility. This allows experiments to examine large amounts of data during a machine run and make run time adjustments to their experiments.

25194 **Method for transmitting analog data over a fiber-optic link.** Dyer, G.R. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1026-1029(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The transmission of high-speed analog dat across an insulating break is a common requirement for present fusion experiments, and it will be a necessity for a reactor-like device. Presently available systems tend to be complex, slow, and expensive. A method is described for implementing a fiber-optic link with analog data input and output. Two realizations of the method are given. A medium-speed system using monolithic circuitry is capable of a dc to 20-KHz bandwidth with excellent linearity and a dynamic range of at least 60 dB. A higher-speed system uses some discrete circuitry to attain a 500-KHz bandwidth with at least a 40-dB dynamic range. Both systems use a relatively inexpensive digital optical link kit combined with a duty cycle modulation scheme for data tramsmission. This method achieves accurate reproduction of complex waveforms without introducing the quantization errors inherent in analog-to-digital conversion, offers bipolar response with low offset and drift, and maintains a constant bandwidth regardless of signal level.

25195 **Wide band fiber optic analog data link.** Cutsogeorge, G. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1030-1033(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A link has been developed that can transmit analog data over a 220 meter fiber optic cable. This is suitable for general diagnostic work. The transmittig end will accept /plus or minus/volt signals on a 50 ohm line and present them to a 50 ohm load at the receiving end of the link. D.C. characteristics of the signal are preserved by an auto-zero loop.and the high frequency cut off is 16 MHz. The overall signal to noise ratio is 59dB and the total harmonic distortion is 0.36%.

25196 **CAMAC timing and sequencing module.** Lawson, J.E. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1034-1037(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Timing and Sequencing Module is a general purpose dual mode CAMAC module, designed to provide a serial sequence of time related trigger or variable width pulse outputs. In mode 1 the output is a series of up to 1024 fixed width pulses with the pulse-to-pulse separation determined by a stored program. In mode 2 up to 512 pulses can be generated with both the pulse-to-pulse separation and the pulse width variable, and controlled by a stored program. It is possible to use this module with its internal 100kHz clock or with an external clock. The module is also capable of retriggering itself at end of each timing cycle up to a maximum of 255 times.

25197 **CAMAC analog signal conditioning module.** Pearson, G.G. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1038-1039(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The CAMAC Analog Signal Conditioning Module is designed to reside in a CAMAC crate and function as a precisely defined interface between signal sources and transient digitizers. Programmable gain, programmable offset voltage, and program selectable output filters are all provided to allow the individual user to configure this module to fit the requirements of his system. Several commercially available modules were evaluated before the decision to build present module was made.

25198 **Data processing system for JT-60.** Ogata, A.; Toyokawa, R.; Nishitani, T.; Kumahara, T.; Tahira, S.; Kambe, T.; Mochizuki, O.; Tahara, N.; Fujioka, A.; Fujita, M. (Jpn At Energy Res Inst, Ibaraki). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1047-1050(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The data processing system for the large tokamak JT-60 has hierarchical structure of a duplex of general-purpose computers and 16 bit microcomputers housed in CAMAC modules. It is characterized by 1) real-time ability to process diagnostic data to feed the results to the control computers for plasma control purpose; 2) recording of all the raw diagnostic data into a PCM recorder; 3) use of high-speed optical fiber links for transmission of data and timing signals; 4) equipment of large general purpose computers with powerful data management and analysis ability; etc.. The number of diagnostic devices is approximately 30, the total number of channels is approximately 22,000 and the amount of raw data is approximately 100 MB/shot.

25199 **Fabrication of the TFTR vacuum vessel.** Reddan, W.; Stoenescu, S.; Warren, J.G.; Nagy, W.; Scott, H. (Ebasco Serv Inc, Princeton, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1369-1372(1981). (CONF-811040-).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A brief description of the vacuum vessel design and fabrication sequence are reported. Some of the unique aspects of the fabrication are described and photographs of the vessels at various stages of the fabrication are included.

25200 **Tokamak limiter design.** Cecchi, J.L. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1378-1382(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The plasma/limiter interaction, which forms the basis for much of the limiter design, is discussed within the framework of a simple model which predicts particle and energy fluxes in the edge region of tokamak plasmas. Experimental data relevant to the model are presented. Specific applications of energy flux distribution for three configurations of TFTR limiters (toroidal, poloidal, and segmented toroidal) are examined.

25201 **Design and analysis of the TFTR fixed limiters - 1.** Winkler, P.; Fixler, S.; Timlen, W.V. (Ebasco Serv Inc, Princeton, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1383-1386(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The operation of the Tokamak Fusion Test Reactor (TFTR) consists of two phases. In the first phase, the Tokamak systems will be tested and an ohmic heated plasma of 4 MW produced. The plasma limiter system for this phase consists of a set of movable and a set of fixed limiters. Because of the low power level during this phase, a design of passively cooled fixed limiters without tiles will satisfy the requirements. This limiter will be replaced by an actively cooled tile-covered axisymmetric limiter in the second phase. This paper discusses the design of the first phase fixed limiters only.

25202 **Design and analysis of the TFTR fixed limiters - 2.** Winkler, P.; Fixler, S.; Timlen, W.V. (Ebasco Serv Inc, Princeton, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1387-1389(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The idealized slat/dielectric/rail assembly is represented by two-dimensional thermal model. Because the plasma thermal load is not uniform over the slat, thermal symmetry could not be used in the analysis. The slat thickness was modeled with a variable-thickness mesh having seven nodes at the thinnest cross-section and 10 nodes over the rails. Each slat has 18 nodes in the toroidal direction. The rails were modeled with a 3 by 2 mesh (excluding the poloidal direction) and one node in the stem of the T. There is a total of 156 nodes for each slat/rail assembly.

25203 **Cryopumps for JET - design of a large scale system of open configuration for high specific pumping speed.** Obert, W.; Rebut, P.H.; Duesing, G. (JET Jt Undertaking, Abingdon, Oxfs, Engl). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1390-1393(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Large scale cryopumpsystems with a pumping speed exceeding 6*10/sup 6/ls-/sup 1/ and a pumping area of 40m/sup 2/ will be installed in each of the Neutral Injector Boxes to be installed at JET. For the design of this advanced cryopump configuration solid angle considerations, Monte Carlo calculations and light simulation measurement have been carried out. The performance data of the configuration have been confirmed by tests on model cryopumps which also included tests in the presence of a high energetic particle beam.

25204 **Mechanical response of cavity tube banks in heavy ion beam fusion reactors.** Engelstad, R.L.; Lovell, E.G. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1556-1559(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The heavy ion beam ICF reactor HIBALL incorporates an annular array of vertical tubes between the cavity per se and the first structural wall. These tubular components (INPORT units) are fabricated from porous woven silicon carbide. Liquid LiPb flows within the units and through the porous walls to form a protective exterior surface film. X-rays vaporize a portion of this layer resulting in an impulsive pressure on the tubes. This paper is concerned with the mechanical response of the SiC INPORT units from this dynamic loading.

25205 **Ceramic torodail vacuum chamber and wall conditioning for the ETL-TPE-2 experiment.** Kiyama, H.; Kiyama, S.; Hakoda, K. (Electrotech Lab, Ibaraki, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1562-1565(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

TPE-2 is a torodial high /beta/screw pinch experiment with an ellitical cross section. This paper presents the design and the fabrication of the torodial ceramic vacuum chamber, the outline of the vacuum system and of major radius of 40 cm and an elliptical cross section of 28 cm.

25206 **Bakeable optical windows for the tokamak fusion test reactor.** Mozeleski, M.; Lewin, G. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1577-1580(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

During the device's life, numerous high temperature bakes will be performed in order to maintain a base pressure of 10/sup -

8/ Torr. Also, when the device enters the radioactive mode of operation, a high density flux of neutron and gamma particles will be emitted from the plasma. This paper discusses the diagnostic window materials chosen for use on TFTR. The discussion includes the mounting method of each type window as well as the testing performed on the window assemblies.

25207 **Design and mechanical analysis of TORE SUPRA vacuum vessels and limiters.** Aymar, R.; Cordier, J.J.; Deschamps, P.; Gauthier, A.; Leloup, C.; Libeyre, P. (CEA, Fontenay-aux Roses, Fr). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1581-1584(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

TORE SUPRA is the new French Tokamak supported by EURATOM. The use of supraconducting coils leads to a complex vacuum system which is described here. The paper reports the main mechanical calculations and how they interfered with the design.

25208 **Leak detection inside a vacuum vessel.** Obara, K.; Abe, T.; Itou, Y.; Iwama, J. (Jpn At Energy Res, Inst, Tokai). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1585-1588(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A facility for leak detection inside a vacuum vessel is developed. It will take the place of conventional helium leak detection method. The facility consists of several devices; a unidirectional detector (a sensor), a vacuum tight manipulator, a simulated defect, a vacuum vessel with a turbomolecular pump system and others. Leak detection experiment on the facility was performed and the position of 3.0*10/sup -///6Torr/BULLET/1/sec helium leak was detected on condition that the sensor was at a distance of 18mm from the defect, and the pressure in the vacuum vessel was 5.0*10/sup -8/Torr.

25209 **Thermal and structural analysis of solid divertor targets for e-beam testing.** Lee, A.Y.; Chianese, R.B.; Easoz, J.R. (Westinghouse Electr Corp, PA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1593-1596(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The objective of the study is to investigate the thermal and structural characteristics of the molybdenum tube under high steady state heat fluxes and cyclic thermal loads. The program included: 1) performing thermal and stress analyses of candidate target geometries in order to select one design for testing; 2) fabricating the assembly and conducting heat transfer experiments using the Westinghouse examinations of the test specimen and performing test data analysis. Several candidate collector target data analysis. These include a plain molydbenum tube, a molybdenum tube with external fins, a copper-molybdenum composite tube and niobium tube of the same dimensions as the plain molybdenum tube. Based on the results of the analysis of the various geometries the plain molybdenum tube was selected to be tested. The test program is presently in progress.

25210 **Design of actively cooled limiters for Alcator A and C.** Morgan, G.D.; Bowers, D.A.; Davis, J.W.; Delaney, M.J.; Ruester, D.E.; Stones, P.B.; Yang, T.F. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1597-1600(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A study was conducted to define a preconceptual design of an actively cooled limiter for Alcator A and C application. The design concepts and structural materials examined are described. The results from thermal-hydraulic and structural analyses of the design/material combinations evaluated are presentd and discused. The limiters reach virtually steady state temperatures far below the melting point, by the end of the assumed 0.5 s discharge. The design recommended for further study is simple to fabricate and HYAS a predicted fatigue life greater than, 10,000 discharge/cool-down cycles.

25211 **Design and test results of an in-torus zirconium/aluminum getter pump system for PDX.** Sredniawski, J.J.; Cecchi, J.L.; Dylla, H.F. (Grumman Aerosp Corp, Bethpage, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1601-1604(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A description of the TFTR Surface Pumping System was presented at the 8th Symposium on Engineering Problems of Fusion Research. This system consists of 36 pumping panels distributed within the vacuum vessel. To enhance plamsa impurity and density control, pumping is achieved by means of corrugated water modules coated with St 101, zirconium/aluminum alloy powder./sup 2/. Since gettering in this manner has never performed within a Tokamak, a prototype experiment was performed in PDX at Princeton. This paper describes the design, installation, and testing of the prototype pumping panels in PDX.

25212 **Full-scale model of cooling and heating system for JT-60 vacuum vessel.** Kajiura, S.; Owada, K.; Sato, H.; Furuyama, M.; Yamamoto, M.; Shimizu, M.; Ohta, M.; Iijima, T. (Hitachi Ltd, Jpn). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1637-1640(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A full-scale model of a rigid sectorial ring and a set of bellows which was covered with a temperature control layer and a coolant supply equipment was constructed to verify the adequacy of the heating and cooling system designed for JT-60. To cool and heat it effectively and to decrease the temperature differences among the various parts in the vacuum vessel, heater units and cooling pipes were located on the surface of the ring. The temperature control layer is to heat the vessel to 500/degree/sub //C within 70 hours and to maintain it at the temperature for 48 hours for simulating the state of bakeout. Subsequently the vessel is cooled down within about the same time as in heating. Prior to the series of tests, numerical analyses were performed to predict the cooling and heating efficiencies on the model and to examine the method of the temperature regulation.

25213 **Fabrication of the torus assembly for the OHTE confinement experiment.** Curwen, B. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1645-1648(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The ohmically heated toroidal experiment (OHTE) is an alternate magnetic confinement fusion concept being developed at General Atomic. A confinement test experimental device has been assembled and physics testing was initiated in early 1981. The device is of modular design and incorporates an E-Coil solenoid, poloidal field coils and a torus assembly all supported by a pedestal. The torus assembly consist of the plasma chamber, conducting shell, and the helical coils. This paper describes the manufacturing techniques for the torus assembly components and also the tolerancing system.

25214 **Engineering and design aspects of the TFTR vacuum vessel bakeout and cooling system.** Reddan, W.; Stoenescu, S. (Ebasco Serv Inc, New York, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1649(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper presents the engineering and design aspects of the TFTR-Vacuum Vessel Cooling Systems (the Shell System and the Bellows System) and the bakeout System. The fabrication of the systems is presently under construction at Chicago Bridge and Iron, Greenville, PA. A previous described the preliminary fluid (dry air and nitrogen) systems used to cool and heat the Vacuum Vessel.

This paper updates the previous one. The emphasis is on the engineering approach, evaluation and design related to the three major operational scenarios of the TFTR, namely - Normal Operation, Discharge Cleaning and Bakeout. This paper presents the cooling and heating loads, the flow distribution, one-dimensional temperature distribution evaluation, poloidally and toroidally, a bakeout scenario and the corresponding design solutions, such as the heating/coolilng jacket, diagnostic covers with remote jumper lines, access plates and adjustable orifices in order to balance the flow.

25215 **TFTR neutral beam calorimeter fabrication and instrumentation.** Perry, E.D.; Brown, G.M.; Dudek, L.E. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1662-1665(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TFTR Neutral Beam Calorimeter were designed by Lawrence Livemore Laboratory and Lawrence Berkeley Laboratory, but while the production units were being fabricated by the Plasma Physics Laboratory, several design changes were made. The major alterations included a detailed examination of the braze joints and cooling tubes along with techniques for inspecting the joints, and changing the temperature measurement instrumentation from thermistors to thermocouples. In addition, the water pipes were changed from custom bent pieces to assemblies of off the shelf street elbows and metal bellows, the motor control wiring was reworked to interface with the various TFTR control systems, and a second set of guide rollers was added to the retraction mechanism in order to provide smoother operation. Also, separate blow-out lines for each vee were added in order to increase the reliability of sufficiently purging the cooling systems and provide the capability of draining a single vee should it develop a leak.

25216 **Testing of water-cooled cathodes on the Westinghouse high surface heat flux test facility.** Easoz, J.R.; Nahemow, M.D. (Westinghouse Electr Corp, Pittsburgh, PA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1670-1673(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

As Fusion programs progress from proof-of-principle experiments toward practical fusion power reactors, parallel programs are needed to develop components capable of withstanding the extreme surface heat and particle fluxes that will be encountered. The separation of the surface physics and heat flux effects appears to be a quick and economical route to successful component design. Realizing the need for such testing systems, Westinghouse in early 1979, initiated a program to build a pressurized water heat transfer loop that could be used in conjunction with an in-place high power electron beam system (previously used for e-beam welding research) to investigate high surface heat flux (1 to 5 kW/cm/sup 2/) dissipation concepts for use in potential fusion reactor components. This system was completed early in 1980. This report describes the system, the results of the first tests fone using the system, and upgrades to the current system initiated or proposed as a result of initial operation.

25217 **Mirror fusion test facility electrical systems, status and plans.** Lindquist, W.B. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1674(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Mirror Fusion Test Facility (MFTR), a single cell, large scale mirror machine has been under construction at Lawrence Livermore National Laboratory (LLNL) sine October 1977 and was due to be completed October 1981. New machine has been designed to make maximum use of the systems constructed for MFTR with minimum modification. The electrical systems required for MFTF included; magnet electrical systems, Sustaining Neutral Beam Power Supply System, Startup Neutral Beam Power Supply System, Neutral Beam Sources, Plasma Streaming System, Supervisory Control and Diagnostics System, Local Control and Instrumentation Systems, Personnel Safety System and The High Voltage Test Stand (a neutral beam source test facility). This overview paper briefly discusses each of the electrical systems giving desired peformance characteristics, status and the overall plan to complete the electrical system for MFTF-B. The highlights from Technology Demonstration, a transition milestone between MFTF and MFTF-B, are also discusses.

25218 **Theoretical and experimental evaluation of the parameters in the new configuration of ETA-BETA II.** Fellin, L.; Guarnieri, M.; Machio, A.; Piovan, R. (EURATOM, Padua, Italy). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1688-1691(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Some modifications have been introduced in Eta-Beta II in order to achieve information about the expected behavior of the next generation of RFP machines. The inductor have been changed, thus increasing the rise time of the plasma current up to 0.5 ms; and active crowbar has been added, in order to extend the duration of the discharge. Moreover a detailed analysis of the inductor system has been carried out and a new equivalent network is proposed to simulate more accurately the machine behavior at the longer cooperating times.

25219 **Selection of vacuum seals for EBT-P.** Dillow, C.F.; Adlon, G.L.; Stubblefield, V.E. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1713-1716(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Elmo Bumpy Torus Proof of Principle (EBT-P) is a magnetic fusion RandD facility being constructed by McDonnell Douglas Astronautics Company - St. Louis Division of Oak Ridge National Laboratory (ORNL). EBT-P is a truly unique fusion device requiring careful consideration in selecting both the primary vacuum seals on the toroidal vessel and the secondary vacuum seals in components such as vacuum pumps and and valves. The vacuum seal environment is described and the considerations in vacuum seal selection fully discussed. Methods for protecting vacuum seals in pumps and valves from the microwave environments are also presented.

25220 **Improved materials testing module for magnetic fusion.** Sawan, M.E.; Sze, D.K.; Kulcinski, G.L. (Univ of Wis, Madison, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1797-1800(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The REGAT module, and improved materials testing module for magnetic fusion engineering test facilities, is presented. The damage gradients in the Module are reduced by exposing the sides of the module to direct fusion neutrons. A neutronics analysis is presented to assess the effectiveness of using the REGAT module in reducing damage gradients and increasing average damage levels.

25221 **Sensitivity of commercial ion gage tubes.** Tilford, C.R. (NBS, Washington, DC, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1924-1927(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Fusion science and engineering requires an increasing number of accurate vacuum measurements. In order to determine what level of performance can be expected from different ion gages a gage characterization program has been initiated. This program determines the uniformity, accuracy, and linearity for different gage tubes, and for the more promising candidate futher characterizes the sensitivity for different gases and the effects of changing bias voltages and emission currents. Results to date show the best performance from conventional triode and tubulated Bayard/Alpert gages with tungsten filaments. Significantly poorer results are obtained from nude Bayard/Alpert gages and gages with thoriated iridium filaments.

25222 **Analysis and design of short, iron-free dipole magnets.** Harvey, A.R. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 95-98([nd]).

Iron-free, dipole magnets are used extensively as steering magnets to correct for the bending, induced by extraneous magnetic fields, of particle beams that are being tranported in vacuum. Generally, the dipoles are long enough that the space occupied by the end conductors is small compared to the overall magnet length. In a recent application, however, this criteria dis not apply. This has motivated a reanalysis of the characteristics of a system of small aspect ratio (length/diameter) dipoles that are spaced at relatively large axial distances. Same observations and conclusions resulting from this analysis are reported. Some fabrication techniques which are being developed in a prototype magnet are also discussed.

99 GENERAL AND MISCELLANEOUS

25223 **(ANL/NESC—982) DOECTZDATA; California sixteen-zone weather data.** Helmich, C. (California Energy Resources Conservation and Development Commission, Sacramento (USA). Conservation Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048982.

DOECTZDATA is a collection of hourly weather data for each of 365 days in a year for sixteen different California thermal zones representing Eureka, Santa Rosa, San Francisco, Santa Cruz, Santa Barbara, Los Angeles, San Diego, Santa Ana, Pasadena, San Bernardino, Red Bluff, Sacramento, Fresno, Daggett, Brawley, and Tahoe. The data presented are in the form of the WBAN Hourly Surface Observation data used by the National Climatic Center, Asheville, North Carolina. They include the sky condition, visibility, weather and/or obstruction to vision information, sea level pressure, dew point temperature, wind direction and speed, station pressure, dry and wet bulb temperature, relative humidity, and cloud and obscuring phenomena information.IBM360; OS/360.

9901 Management

REFER ALSO TO CITATION(S) 23080, 23722

25224 **(ANL/NESC—801) SKILLS INVENTORY; personnel information system.** Boschear, W. (Holmes and Narver, Inc., Las Vegas, NV (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048801.

Each employee's record is limited to 999 ten-character words, including comments. Each update is limited to 999 SKILLS cards.

The personnel SKILLS INVENTORY system consists of the three programs SKILLS, SKLFORM, and SEARCH. Each program is run independently of the others. SKILLS is designed to add, change, and delete personal data; build, search and/or print one master record for each employee entered into the system, whether active or terminated; delete an employee's entire master record; insert indicative comments when required; and perform a general check against an employee personnel card deck to ensure compatibility of data. Using skills search parameter cards, SEARCH can perform a complex variety and combination of searches, including a reverse search, and print various listings on a selective basis. Listing information includes educational degrees, professional licenses, professional society memberships, education, and employment status. SKLFORM converts employees' coded data into readable English language and prints their entire record.CDC6400,7600; FORTRAN IV; SCOPE; The number of words (octal) of small core memory (SCM) required to execute each of the three programs is: SKILLS-62,000, SKLFORM-55,000, and SEARCH-21,000.

25225 **(DOE/IG—104) Investigation of questions of possible document destruction by the Office of Special Counsel for Compliance.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 17 Mar 1980. 38p. TIC. Order Number DE83006126.

Report to the Secretary, Deputy Secretary.

This investigation was requested by two employees of the Office of Special Counsel and by the Director of the Office of Hearings and Appeals. The two issues discussed follow: Have documents in the files of the Office of Special Counsel been improperly destroyed by employees of the Office of Special Counsel; Did the Office of Special Counsel make an adequate response to internal rumors of possible improper document destruction. It was concluded that no documents were improperly destroyed by the Office of Special Counsel (OSC), but the OSC's response to internal rumors of such document destruction was determined to be inadequate. Recommendations are that the OSC provide its staff with formal guidance on how to maintain files that may be relevant to litigation and that OSC act more promptly to report allegations of possible wrongdoing to the Inspector General. Comments to the draft report are appended.

25226 **(DOE/IG—110) Administration of selected support-service contracts.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 18 Apr 1980. 81p. TIC. Order Number DE83006131.

Report to the Secretary, Deputy Secretary.

This report concerns weakness in how the Department of Energy (DOE) administered certain contracts with a consulting firm that provided support services to various offices of DOE. Based on the review of six contracts awarded by DOE Headquarters to two consulting firms, IG previously reported on the payment of high levels of compensation paid to management officials, other employees, and consultants. This report focuses on three contracts held by one of the two consulting firms discussed in the earlier report. All three contracts are of the cost-reimbursable type, and they were awarded without competition. The total value of the three contracts is about $1 million; and as of October 1979, about $720,000 had been paid out for these contracts. Excess profits; delayed completion date; inadequate procedures for contractors performance monitoring; and unauthorized work projects and personnel are discussed. (PSB)

25227 **(DOE/IG—115) Costly delays in the purchase of a scientific computer for the Solar Energy Research Institute.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 23 May 1980. 18p. TIC. Order Number DE83006498.

Report to the Secretary, Deputy Secretary.

The circumstances that caused the Department of Energy (DOE) to waste about $200,000 in connection with the purchase of a large scientific computer for the Solar Energy Research Institute (SERI), a DOE contractor located at Golden, Colorado, were examined. Wasted expenditures were attributed to untimely processing of the required congressional approval requests. (PSB)

25228 **(DOE/IG—120) Management of furniture at Department of Energy headquarters locations.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 27 Jun 1980. 74p. TIC. Order Number DE83006318.

Report to the Secretary, Deputy Secretary.

Where investigations showed no management system nor inventory data for office furniture acquisition, control and disposal, recommendations were made that FY 1980 furniture purchasing plans be reevaluated in light of current inventories and updated staffing plans. Tighter Controls for authorizations for new purchases plus establishment of reliable DOE procedures for managing office furniture were also recommended. Comments on the draft report are appended. (PSB)

25229 **(DOE/IG—121) Receipt and use of half-fare airline coupons at selected Department of Energy field locations.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 11 Aug 1980. 27p. TIC. Order Number DE83006319.

Report to the Secretary, Deputy Secretary.

The receipt and use of half-fare coupons obtained by employees of DOE field offices and DOE contractors while traveling at DOE expense were reviewed. These coupons, issued by United Airlines and American Airlines, provided for air travel at half-fare if used before December 15, 1979. Potential savings to DOE through coupon use ranging from $50,000 to $100,000 were lost, because of ineffective management action by both federal and contractor officials. Recommendations were that DOE ascertain the extent of the failure of contractors to recover coupons from their employees and recover from the contractors the amounts lost. IG submitted a draft of this final report for comment and received the comments of the Controller, the Director of Administration, and the Director of Procurement and Contracts Management. The comments included useful information; and where appropriate, the final report was changed to reflect the comments. In addition, the comments in their entirety are contained in the appendices.

25230 **(DOE/IG—133) Investigation of allegations of favored treatment of a relative of a senior official of the Department of Energy.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 23 Sep 1980. 63p. TIC. Order Number DE83006625.

Report to the Secretary, Deputy Secretary.

Where efforts were made by DOE officials to influence a contractor to employ a relative of another DOE official, investigators concluded this was a violation of the federal laws against nepotism (5 USC 3110 and 2302(b) (7)). In addition, those actions and arrangements for that family member's trip to Alaska appear to have violated DOE regulations for employees' conduct, which prohibit preferential treatment of members of the public by DOE officials. Recommendations were given for: appropriate disciplinary actions; reminding DOE officials of their responsibility to refrain from impropriety with employment referrals to DOE contractors; revision of DOE regulations on invitational travel to pay for trips by private citizens to perform work usually done by DOE employees; and encouraging employees to report possible abuse and wrongdoing in administering DOE programs. Comments and compliance plans are appended. (PSB)

25231 **(DOE/MA—0006/8) Quarterly status of Department of Energy projects.** (USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Project and Facilities Management). 31 Dec 1982. 345p. NTIS, PC A15/MF A01. Order Number DE83009279.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This Quarterly Status of Department of Energy Projects is prepared by the Office of Project and Facilities Management. The report is designed to provide Department of Energy (DOE) management officials with a summary of the important baseline data that exists in the DOE project data base. This data base is maintained chiefly from periodic field management reports required by DOE. Since most of the current estimates in this report are from field project managers, they do not necessarily have full Headquarters approval. The current budget data sheet estimates that appear in the report are considered appropriate for reporting external to the Department and reflect the President's FY 1984 Budget to Congress.

25232 **(UCRL—88904) Implementing affirmative action in conservative times.** Smith, M.R. (Lawrence Livermore National Lab., CA (USA)). 15 Mar 1983. Contract W-7405-ENG-48. 13p. (CONF-830322—1). NTIS, PC A02/MF A01. Order Number DE83009242.

From 4. national conference on equal employment opportunity and affirmative action; Atlanta, GA, USA (2 Mar 1983).

An affirmative action implementation is presented based on these steps: strategy, tactics, training, excellence, peripheralness, politics, and sensitivity. (GHT)

9902 Mathematics And Computers

REFER ALSO TO CITATION(S) 23837, 24493, 25081

25233 **(ANL/NESC—753) OCOPTR;DRVOCR; unconstrained optimization.** Nazareth, J.L. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048753.

The functions to which the routine is applied are assumed to be differentiable. The routine also requires (n**2/2) + 0(n) storage locations where n is the problem dimension. Reference reports, TM-303 and TM-306.

OCOPTR and DRVOCR are computer programs designed to find minima of non-linear differentiable functions f: R**n—>R with n dimensional domains. OCOPTR requires that the user only provide function values (i.e. it is a derivative-free routine). DRVOCR requires the user to supply both function and gradient information.IBM360,370; FORTRAN IV; OS/MVT; 50K of memory is required.

25234 **(ANL/NESC—764) SOERP; second-order error propagation code.** Cox, N.D.; Miller, C.F. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048764.

The maximum number of component variables allowed is 30. The IBM version will only process one set of input data per run.

SOERP computes second-order error propagation equations for the first four moments of a function of independently distributed random variables. SOERP was written for a rigorous second-order error propagation of any function which may be expanded in a multivariable Taylor series, the input variables being independently distributed. The required input consists of numbers directly related to the partial derivatives of the function, evaluated at the nominal values of the input variables and the central moments of the input variables from the second through the eighth.IBM360,370;CDC7600; FORTRAN IV; OS/360,370 (IBM360,370) and SCOPE (CDC7600); A card reader, tape unit, line printer, and 80K bytes of storage are required for the IBM version; 14,000 (octal) words of SCM are required for the CDC version.

25235 **(ANL/NESC—765) ZONE; 2-dimensional finite element mesh generator.** Burger, M.J. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048765.

The following are limited only by a DIMENSION statement. The code currently has a maxima of 100 coordinate points defining a meridian or ray, 40 meridians, 40 layers. There are no limits on the number of zones or nodes for any problems.

The ZONE program is a finite element mesh generator which produces the nodes and element description of any two-dimensional geometry. The geometry is divided into a mesh of quadrilateral and triangular zones defined by node points taken in a counter-clockwise sequence. The zones are arranged sequentially in an ordered march through the geometry. The order can be chosen so that the minimum bandwidth is obtained. The mesh that is generated can be used as input to any two-dimensional as well as any axisymmetrical structure program.CDC7600; FORTRAN; SCOPE; 8 output and scratch files are used.

25236 **(ANL/NESC—766) FRANTIC-NRC; time-dependent system unavailability.** Vesely, W.E.; Goldberg, F.F. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048766.

Reference report, NUREG-0193.

FRANTIC-NRC was developed to investigate periodic testing schemes and operational and design modifications as they affect system unavailabilities and accident probabilities. The program calculates both the instantaneous and the average unavailability for any general system model and gives a breakdown of the unavailability contributions from failures, testing, and repair. Non-repairable components, monitored components, and periodically-tested components are considered. Accident sequences, such as those constructed from event trees, can also be evaluated for their instantaneous and average probability behavior. The name FRANTIC is an acronym for Formal Reliability Analysis including Normal Testing, Inspection and Checking. The code represents one extension of the probabilistic methodology described in WASH-1400. Testing characteristics which can be specified as input data include the test interval, test duration time, repair time or allowed downtime, the test override capability, test efficiency, and associated human-caused failure probabilities. The output consists of tables and plots of the system unavailability along with a breakdown of the unavailability contributions. Sensitivity studies can be performed.IBM370; FORTRAN IV; OS/370; 140K bytes of memory are required for execution.

25237 **(ANL/NESC—769) PCTEST; principal component test for outliers.** Kane, V.E. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048769.

Programming is done in single-precision; conversion to double-precision would not be difficult. Dynamic dimensioning is used to accommodate a large variety of data sets. Reference report, K/UR-7.

PCTEST performs principal component analysis on multivariate data with emphasis on methods which can be used to detect outlier data.IBM360,370; FORTRAN IV; OS/360,370; 260K bytes plus array storage (total of approximately 265K bytes for 100 samples, 10 variables).

25238 **(ANL/NESC—773) PRPLOT; line printer plot subroutine package.** Walker, R.S.; Rumsey, J. (Texas Univ., Arlington (USA). Public Transportation Center). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048773.

The allowable complexity of the plot is controlled by the size of a work array passed from the calling program. Symbols are generated using only vectors of 0, 90, 180, or 270 degrees, and axes are generated only at 0 or 90 degrees. Reference report, TX-11-0001.

PRPLOT is a line printer graphics subroutine package that maintains compatibility with the CalComp incremental pen plotter software. Calls to PLOT, PLOTS, FACTOR, WHERE, SYMBOL, NUMBER, SCALE, LINE, and AXIS are supported and a dummy NEWPEN subroutine is included. When a large plot size is selected, the plot is generated in page-wide strips to be separated and assembled as the complete plot.IBM370,360; FORTRAN IV; OS/360 (IBM360), OS/370 (IBM370); The PRPLOT subroutines require approximately 50K bytes of storage.

25239 **(ANL/NESC—777) PDEONE; solutions of partial differential equations.** Madsen, N.K. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048777.

Currently only one PDE is allowed to be defined on a given interval (a,b). This may be increased to n PDEs by increasing the dimensions of the arrays in PDEONE.

PDEONE was developed as an interface to allow the software developed in the field of ordinary differential equations (ODEs) to be applied directly to the solution of partial differential equation problems. The original intent was to use PDEONE for solving coupled systems of nonlinear parabolic PDEs and this is reflected in the equations and conditions. However, the solution of other problems such as hyperbolic and elliptic PDEs may also be attempted. The equations are sufficiently general to include PDEs for which solutions may neither exist nor be unique. It is the user's responsibility to define a meaningful problem.CDC7600,6600; FORTRAN IV; SCOPE; 27,000 (octal) words of small core memory are needed to execute the sample problems.

25240 **(ANL/NESC—779) IMPORTANCE; FTA basic event & cut set ranking.** Lambert, H.W. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048779.

IMPORTANCE computes various measures of probabilistic importance of basic events and minimal cut sets to a fault tree or reliability network diagram. The minimal cut sets, the failure rates and the fault duration times (i.e., the repair times) of all basic events contained in the minimal cut sets are supplied as input data. The failure and repair distributions are assumed to be exponential. IMPORTANCE, a quantitative evaluation code, then determines the probability of the top event and computes the importance of minimal cut sets and basic events by a numerical ranking. Two measures are computed. The first describes system behavior at one point in time; the second describes sequences of failures that cause the system to fail in time. All measures are computed assuming statistical independence of basic events. In addition, system unavailability and expected number of system failures are computed by the code.IBM370; FORTRAN IV; OS/370; Execution of the sample problem required 140K bytes of storage.

25241 **(ANL/NESC—781) SPEKEN; Pearson, Spearman & Kendall correlation.** Larson, N.M. (Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048781.

Reference report, K/UR-8.

SPEKEN computes Pearson, Spearman, and Kendall correlation coefficients and associated significance levels for multivariate data. Special features of the program include exclusion of pairs of data values where one value is missing, and adjustment for tied rankings. The hypothesis of independence between each pair of variables can be tested using the obtained significance level for each correlation.IBM360,370; FORTRAN IV; OS/360,370; Standard system input and printer and punch output units are required.

25242 **(ANL/NESC—800) LINPACK; simultaneous linear algebraic equations.** Dongarra, J.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048800.

There are no subroutines for general sparse matrices or for iterative methods for very large problems.; Reference reports, SAND-77-0898 and ANL-80-105, and NESC Note.

LINPACK is a collection of FORTRAN subroutines which analyze and solve various classes of systems of simultaneous linear algebraic equations. The collection deals with general, banded, symmetric indefinite, symmetric positive definite, triangular, and tridiagonal square matrices, as well as with least squares problems and the QR and singular value decompositions of rectangular matrices. A subroutine-naming convention is employed in which each subroutine name consists of five letters which represent a coded specification (TXXYY) of the computation done by that subroutine. The LINPACK package also includes a set of routines to perform basic vector operations called the Basic Linear Algebra Subprograms (BLAS).IBM360,370 (designed to be machine-independent); FORTRAN; OS/360,370 on the IBM360,370; The entire coefficient matrix will usually be stored in the computer memory, although there are provisions for band matrices and for row-by-row processing of large rectangular matrices. 240K bytes of storage are required for execution of a typical sample problem on the IBM360,370 system.

25243 (ANL/NESC—803) BASIC2 INTERPRETER; minimal basic language. McGoldrick, P.R.; Allison, T.G. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048803.

Reference report, UCID-17752.

The BASIC2 INTERPRETER was developed to provide a high-level easy-to-use language for performing both control and computational functions in the MCS-80. The package is supplied as two alternative implementations, hardware and software. The "software" implementation provides the following capabilities: entry and editing of BASIC programs, device-independent I/O, special functions to allow access from BASIC to any I/O port, formatted printing, special INPUT/OUTPUT-and-proceed statements to allow I/O without interrupting BASIC program execution, full arithmetic expressions, limited string manipulation (10 or fewer characters), shorthand forms for common BASIC keywords, immediate mode BASIC statement execution, and capability of running a BASIC program that is stored in PROM. The allowed arithmetic operations are addition, subtraction, multiplication, division, and raising a number to a positive integral power. In the second, or "hardware", implementation of BASIC2 requiring an Am9511 Arithmetic Processing Unit (APU) interfaced to the 8080 microprocessor, arithmetic operations are performed by the APU. The following additional built-in functions are available in this implementation: square root, sine, cosine, tangent, arcsine, arccosine, arctangent, exponential, logarithm base e, and logarithm base 10. MCS-80,8080-based microcomputers; 8080 Assembly language; Approximately 8K bytes of RAM to store the assembled interpreter, additional user program space, and necessary peripheral devices. The hardware implementation requires an Am9511 Arithmetic Processing Unit and an interface board (reference 2).

25244 (ANL/NESC—806) 2DEPEP; elliptic, parabolic & eigenvalue solutions. Sewell, E.G. (Purdue Univ., Lafayette, IN (USA). Dept. of Computer Science). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048806.

At most two simultaneous partial differential equations can be solved. The input data set is limited to 200 cards. This can be increased by changing the value of the variable MXCARD and increasing the dimensions of the arrays L, INDX, and LNAM in the preprocessor.

2DEPEP solves the partial differential equation system: C1(X,Y,U,V,T)*DU/DT=D(OXX)/DX+D(OXY)/DY+F1(X,Y,U,V,T) C2(X,Y,U,V,T)*DV/DT=D(OYX)/DX+D(OYY)/DY+F2(X,Y,U,V,T) in a general two-dimensional region, R, with U=FB1(S) V=FB2(S) for S on BR1, and OXX*NX+OXY*NY=GB1(S,U,V,T) OYX*NX+OYY*NY=GB2(S,U,V,T) for S on BR2, where BR1 and BR2 are distinct parts of the boundary. (NX,NY)= unit outward normal. U=U0(X,Y) V=V0(X,Y) for T=T0, and OXX=OXX(X,Y,DU/DX,DU/DY,DV/DX,DV/DY,T) OXY=OXY(X,Y,DU/DX,DU/DY,DV/DX,DV/DY,T) OYX=OYX(X,Y,DU/DX,DU/DY,DV/DX,DV/DY,T) OYY=OYY(X,Y,DU/DX,DU/DY,DV/DX,DV/DY,T). The Jacobian matrices of derivatives of OXX,OXY,OYX,OYY with respect to DU/DX,DU/DY,DV/DX,DV/DY and of F1,F2 with respect to U,V and of GB1,GB2 with respect to U,V must be symmetric. The related elliptic and eigenvalue problems are also solved by 2DEPEP and single equations can be handled efficiently. Examples of applications of the program are elasticity, one- or two-component diffusion, heat conduction, minimal surface, potential problems and the time-independent and time-dependent Schrodinger equations.CDC6500,7600; FORTRAN IV; SCOPE; 120K (octal) words of memory are required together with an auxiliary storage device, such as disk or tape, for temporary use in large problems (unit 2), and another storage device for temporary use to store the preprocessor output (unit 4).

25245 (ANL/NESC—812) DWG100RQ;DWG101RQ; convert to or from SI units. Scott, J.T.; Branscomb, D. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048812.

DWG100RQ,DWG101RQ consists of five programs used to convert SI metric units of measurement from engineering drawings to U.S. customary dimensions based on the rounding rules specified in the Mound Laboratory Design/Drafting Standard DWG No. SPA760290 (DWG100RQ), or to convert U.S. customary units of measurement from engineering drawings to SI metric dimensions based on the rounding rules specified in the Mound Laboratory Design/Drafting Standard DWG No. SPA800269 (DWG101RQ). The five programs are MTRC0001, MTRC0002, MTRC0003, MTRC0004, and MTRC1001. MTRC0002 is a preprocessor used to format input data to align decimal points, generating 83-character data records that can be easily sorted. MTRC0003 and MTRC0004 sort numerical data based on the sign of the number and the sign of the exponent. MTRC0003 writes the numerical data to one of four files based on whether the number is positive or negative and whether the exponent is positive or negative. These files are then sorted by the IBM System SORT utility and merged by MTRC0004 for input either to MTRC0001, if metric units are to be converted to U.S. customary units, or to MTRC1001, if U.S. customary units are to be converted to metric units.IBM360,370,303x; FORTRAN IV (85%) and COBOL Version 4 (15%); OS/360; 50K bytes of memory are required to execute MTRC0002, MTRC0003, and MTRC0004. MTRC0001 and MTRC1001 require 90K bytes and the IBM SORT utility uses 70K bytes.

25246 (ANL/NESC—816) DPOLE; helmholtz equation on general 3-dimensional region. Widlund, O. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048816.

Reference report, COO-3077-155.

DPOLE solves the Dirichlet problem for the Helmholtz equation over a general bounded three-dimensional region imbedded in a unit cube -W(XX)-W(YY)-W(ZZ)+CC*W=G1 in the region W=F on the boundary where F and G1 are given functions of X, Y, and Z, and CC is a real constant. The boundary is arbitrary.CDC6600,7600; FORTRAN IV, FTN 4.6+460 compiler; SCOPE 3.4.4 (CDC6600), SCOPE 2.1.3 (CDC7600); 52K (octal) words of memory are required.

25247 (ANL/NESC—819) ANOVA; three factor analysis of variance. Carder, J.H.; Grogger, G.M. (Bendix Corp., Kansas City, MO (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048819.

Due to current program dimensions, maxima of 40 levels of factor A, 20 levels of factor B, 20 levels of factor C, and 100 repeats are allowed. Reference report, BKC Document 25.

ANOVA provides the analysis of variance techniques necessary to analyze experimental data. Four models can be used to analyze one, two, or three factor experiments, with the factors being either fixed or random. These models are: fully crossed, fully nested, factors A and C crossed with B nested in A, and factors A and B crossed with C nested in AB.CDC6600; FORTRAN IV; SCOPE; 55,000 (octal) words of memory.

25248 (ANL/NESC—820) SLATEC1.0; mathematical subroutine library. or A. B. White, W.R.B. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048820.

Reference reports SAND-82-0202 and LA-UR-80-3631.

SLATEC is a large collection of FORTRAN mathematical subprograms brought together in a joint effort by the Air Force Weapons Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Magnetic Fusion Energy Com-

puting Center, National Bureau of Standards, Sandia National Laboratories (Albuquerque and Livermore), and the Union Carbide Corporation Nuclear Division at Oak Ridge National Laboratory. SLATEC is characterized by portability, good numerical technology, good documentation, robustness, and quality assurance. The library can be divided into the following subsections following the lines of the SHARE classification system: Special Functions, Polynomial Zeros, Quadrature, Interpolation, Approximation - Interpolation and Data Fitting, Linear Equations, Ordinary Differential Equations, Eigenanalysis, Vector Operations, Linear Least Squares, Fast Fourier Transforms, Nonlinear Equations and Linear Least Squares, and Fast Poisson Solvers.CRAY1;CDC CYBER175 (designed to be machine-independent); FORTRAN; NOS 1.4 (CDC CYBER175) (designed to be operating system independent).

25249 **(ANL/NESC—822) LR; LR(1) grammar analyzer & parser generator.** Shannon, A.W. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048822.

The vocabulary is limited to 500 items. The number of productions is limited to 500. The size of the parsing automaton is also limited based on the complexity and number of states. A relatively large number of simple states or a relatively small number of complex states is possible. Reference report, UCRL-82926.

LR is an LR(1) parsing system written entirely in ANSI standard FORTRAN-66. The system includes a grammar analyzer program which reads a context-free grammar as input and produces LR(1) parsing tables as output, and a skeleton parser that, when compiled with the tables as data, will parse the language defined by the grammar. Table generation also produces a complete grammar listing with error messages, diagnostic data, and a trace of the parser generation process.IBM370; FORTRAN (ANSI X3.9-1966); OS/370; One input unit (LUN20) and one output unit (LUN21) are required. Disk is suggested for output. The program uses approximately 40,000 decimal words of working storage at LLL. LR requires 278K bytes of storage to execute the sample problems on an IBM370/195.

25250 **(ANL/NESC—825) MESA; maximum entropy time series analysis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Winkle, W.V. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048825.

Maxima of, 5 spectra 5 transformations, 600 data points, 599 frequencies. Reference report, ORNL-5332.

The MESA program determines periodic components from input data which represent a time series. Transformations may be performed on the raw data before doing the spectral analysis. Routines are included to calculate both the Fourier spectrum and maximum entropy spectrum, the Yule-Walker estimates of the autocovariance function, the periodogram ordinates, the cumulative periodogram, the autocorrelation function resulting from the maximum entropy computations, and the final prediction error, if desired.IBM360,370; FORTRAN IV; OS/360 (IBM360), OS/370 (IBM370); 250 to 320K bytes of main memory are required with one input unit (logical unit 5) and one output unit (logical unit 6).

25251 **(ANL/NESC—827) FASTCAR; solution of Cauchy-Riemann equations.** Ghil, M.; Balgovind, R. (New York Univ., NY (USA). Courant Inst. of Mathematical Sciences). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048827.

The number of mesh points is dependent on the type of boundary conditions. For U(x,y) and V(x,y) periodic in x, the number of mesh points in x must be a power of 2. For the other two cases (see item 7), the number of mesh points in y for V(x,y) must be a power of 2 plus 1.

FASTCAR (a fast Cauchy-Riemann solver) solves a second-order accurate, discrete form of the inhomogeneous Cauchy-Riemann equations on a rectangle: Ux + Vy = d(x,y), Uy - Vx = e(x,y). Any one of the following combinations of boundary conditions is possible: (a) U(x,y) and V(x,y) are periodic in x. V(x,y) is assigned on the bottom and top of the rectangle, and the sum of U(x,y) is assigned over x for some fixed y. (b) V(x,y) is assigned on the bottom, top, and right sides of the rectangle, and U(x,y) is assigned on the left side. (c) V(x,y) is assigned on the bottom and top, and U(x,y) is assigned on the left and right of the rectangle. Numerical results indicate second-order accuracy even in cases where solutions do not have the smoothness required for the appropriate theoretical estimates.CDC6600,7600;IBM360,370; FORTRAN IV; SCOPE (CDC6600,7600), OS/370 (IBM370); 102,000 (octal) words of memory (CDC6600), 260K bytes of memory (IBM370).

25252 **(ANL/NESC—829) OPTIMIZERS; nonlinear optimization subroutines.** Hillstrom, K.E. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048829.

No subroutines for derivative-free unconstrained optimization or for sparse nonlinear systems of equations are included.

OPTIMIZERS is a collection of FORTRAN subroutines addressed to the unconstrained nonlinear optimization problem. The specific problem areas covered by the routines are - (a) unconstrained optimization, (b) nonlinear least-squares optimization, and the (c) solution of nonlinear systems of equations.IBM360,370; FORTRAN IV; OS/370; 250K bytes of storage.

25253 **(ANL/NESC—834) MOL1D; partial differential equations solution.** Hyman, J.M. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048834.

Unsymmetric differences are restricted to hyperbolic equations in characteristic form. The Fourier method may be used only in periodic problems. Reference report, LA-7595-M.

MOL1D is a FORTRAN subroutine package for the method-of-lines solution for systems of initial-boundary-value partial differential equations in one space dimension. This package allows a programmer with limited experience in numerical analysis to accurately solve linear and nonlinear hyperbolic equations with or without discontinuities, linear and nonlinear parabolic equations, including those arising in reaction-diffusion equations, and elliptic boundary value problems when posed as the stable time-independent solution of a parabolic equation. Systems are handled as easily as single equations, and a wide variety of boundary conditions can be accommodated.CDC6600,7600;Amdahl470;IBM3033; FORTRAN IV; SCOPE 2.1.5 (CDC7600) and OS/MVS (IBM3033); 58K (octal) words of memory are required on the CDC7600, 105K (octal) words on the CDC6600, and 270K bytes on the IBM3033.

25254 **(ANL/NESC—838) CONF; conference attendee & speaker data file.** Celoni, C.; Joiner, E. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048838.

CONF is a simple tape or disk file system designed to assist conference planners in maintaining information pertaining to attendees, speakers, and other record-keeping aspects for any conference.CDC6600; COBOL 4.5.; SCOPE 3.4.4; 16,000 (octal) words of memory are required by the CONF-010 and CONF-030 programs, and 22,000 (octal) words of memory are used by CONF-020.

25255 **(ANL/NESC—840) DENDRO; hierarchical cluster analysis of data.** Larson, N.M.; Begovich, C.L. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048840.

A pairwise distance matrix is stored. This matrix requires N(N-1)/2 (where N is the number of objects) storage locations. Reference report, ORNL/CSD/TM-120.

DENDRO performs hierarchical cluster analysis of experimental data with options for data normalization, metrics, and clustering criteria. A dendrogram, or tree plot, can be generated on a line printer or plotter illustrating which clusters are combined at what distance.IBM360,370; FORTRAN IV (98%) and Assembly language (2%); OS/360,370; Storage required depends on problem size; small problems with 100 to 200 objects can be executed in 260K bytes of memory.

25256 **(ANL/NESC—843) RANDOM NUMBERS; obtained from U235 alpha decay.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy; Tyler, S.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048843.

The RANDOM NUMBERS tape contains 2,669,568 31-bit numbers.

RANDOM NUMBERS is a data collection of almost 2.7 million 31-bit random numbers generated by using a high resolution gas ionization detector chamber in conjunction with a 4096-channel multichannel analyzer to record the radioactive decay of alpha particles from a U-235 source. The signals from the decaying alpha particles were fed to the 4096-channel analyzer, and for each channel the frequency of signals registered in a 20,000-microsecond interval was recorded. The parity bits of these frequency counts, 0 for an even count and 1 for an odd count, were then assembled in sequence to form 31-bit random numbers and transcribed onto magnetic tape. This cycle was repeated to obtain the random numbers.IBM370,303x; Binary (random numbers) and FORTRAN IV (AFRAND and Driver); OS/370; The auxiliary program AFRAND requires 55K bytes of memory for execution with the test case provided. Random numbers from the tape are read from tape unit 13.

25257 **(ANL/NESC—848) SYSREL; reliability analysis of series systems.** Biver, C.J. (General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048848.

Maxima of 10 stages, 5 components per stage SYSREL is only applicable to series systems. However, the method outlined may be extended to series-parallel systems, although not with little effort. Reference report, GEPP-TIS-411.

The SYSREL program uses a Monte Carlo simulation procedure to derive estimates of the reliability of systems consisting of a series of stages, each of which may be composed of components of equal or unequal reliability values operating in active, partial, or standby redundancy modes. In all cases a constant failure rate (exponential distribution of component life) is assumed. However, the addition of other descriptions of component life, such as gamma, log-normal, etc. would be relatively simple.Honeywell Series 60 Level 66,6000; BASIC; GCOS.

25258 **(ANL/NESC—967) SOFTWARE TOOLS; program development interface.** Scherrer, D.K. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048967.

One of the problems encountered by computer users is the lack of common utility routines for different computer systems. The software which was initially presented in Kernighan and Plauger's SOFTWARE TOOLS represented a first step toward a solution to this problem. A common editor, text formatter, sort, and other program development tools were presented through two mechanisms: (a) all source was written in RATFOR, a FORTRAN preprocessor language directly translatable into FORTRAN, and (b) system-dependent routines were pushed down either into macro replacements or primitive function calls, to be implemented by the individual charged with bringing up the utilities in the local computing environment. These mechanisms, together with adoption of certain conventions pertaining to data types, permit many sites running different operating systems to implement these tools. If the shell, or command line interpreter, is implemented, this software can essentially define a portable "virtual operating system" providing inter-system uniformity at the three levels of user interface--virtual machine (the primitives), utilities, and command language. The SOFTWARE TOOLS package consists of a set of program development utilities and a program library modelled after the Bell Laboratories' proprietary UNIX operating system.Base version (This version is not tailored to any one machine but serves as a portable base for the user who can add "primitives" or modify the base source to tailor SOFTWARE TOOLS to the local computing environment.); FORTRAN IV and RATFOR.

25259 **(ANL/NESC—968) SLIC; interactive graphics 3-d mesh generation.** Gerhard, M.A. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048968.

Compressed data storage allows up to 32,762 points on the logical cube and a similar number on the actual mesh. Each logical point requires 1/4 word of small core memory (SCM), and each actual point retained requires four words of large core memory (LCM). SCM and LCM are dynamically allocated by the SLIC program.

SLIC is an interactive graphics mesh generator developed for use with finite-element and finite-difference method application programs. The interactive graphics display coupled with mesh modification commands provides the user the ability to 'manipulate' the mesh and immediately view the result of this action. This capability facilitates the construction of complex models.CDC7600; FORTRAN IV (99%) and COMPASS (1%); SLP (SLOPE); 102,000 (octal) words of small core memory and 400 (octal) words of large core memory are required to execute the sample problem..

25260 **(ANL/NESC—972) NJE; VAX-VMS IBM NJE network protocol emulator.** Engert, D.E.; Raffenetti, C. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048972.

Restrictions are related to functionality required of an end-node. The NJE protocol supports only those 'print' files with record sizes less than or equal to 133 bytes and 'punch' files with record sizes of 80 bytes.

NJE is communications software developed to enable a VAX VMS system to participate as an end-node in a standard IBM network by emulating the Network Job Entry (NJE) protocol. NJE supports job networking for the operating systems used on most large IBM-compatible computers (e.g., VM/370, MVS with JES2 or JES3, SVS, MVT with ASP or HASP). Files received by the VAX can be printed or saved in user-selected disk files. Files sent to the network can be routed to any network node for printing, punching, or job submission, or to a VM/370 user's virtual reader. Files sent from the VAX are queued and transmitted asynchronously. No changes are required to the IBM software.DEC VAX11/780; VAX-11 FORTRAN 77 (99%) and MACRO-11 (1%); VMS 2.5; VAX11/780 with DUP-11 UNIBUS interface and 9600 baud synchronous modem..

25261 **(ANL/NESC—975) INGEN; finite element program mesh generator.** Cook, W.A. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048975.

The origin cannot be used as the coordinates of a nodal point since the zero coordinates are a test used for nonexistent nodal points. To ensure a minimum bandwidth, label the index with the least number of nodal points I and the index with the most nodal points K.

INGEN is a general-purpose mesh generator for use in conjunction with two- and three-dimensional finite element programs. The basic components of INGEN are surface and three-dimensional

region generators that use linear-blending interpolation formulae. These generators are based on an i, j, k index scheme, which is used to number nodal points, construct elements, and develop displacement and traction boundary conditions.CDC7600; FORTRAN IV; SCOPE 2.1.5 (CDC7600); INGEN requires approximately 114,000 (octal) words of small core memory and 274K (octal) words of large core memory for CDC7600 execution..

25262 **(ANL/NESC—986) ELLIPTIC; elliptic integrals by duplication.** Carlson, B.C. (Ames Lab., IA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048986.

Source deck (539 cards) Sample problems (FORTRAN 327 cards, data 180 cards) Sample problems output (12 pages) NESC Note.

ELLIPTIC is a set of four subroutines for numerically evaluating logarithms, arctangents, and elliptic integrals of all three kinds, including complete integrals. Two of the subroutines evaluate the incomplete elliptic integrals of the first and third kinds - RF(x,y,z) =1/2 of the integral with respect to t from 0 to infinity of ((t+x)(t+y)(t+z))**(-1/2), and RJ(x,y,z,p)=3/2 of the integral with respect to t from 0 to infinity of ((t+x)(t+y)(t+z))**(-1/2)/(t+p). The integrals are complete if x=0. The other two subroutines evaluate the special cases RC(x,y)=RF(x,y,y) and RD(x,y,z)=RJ(x,y,z,z). The function RD is an incomplete elliptic integral of the second kind, and RC embraces the logarithm, inverse circular functions, and inverse hyperbolic functions. These functions and others, such as Legendre's elliptic integrals and Heuman's lambda function can be expressed in terms of RC, RF, RD, and RJ (reference 1).NAS AS/6;IBM370 (designed to be machine-independent); FORTRAN IV; OS/MVT (IBM370); NESC used less than 50K bytes on an IBM370/195 for execution of the sample problems..

25263 **(ANL/NESC—988) XERROR; Fortran library error-handling package.** Jones, R.E. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048988.

The internal message table is normally set to a maximum length of 10 messages.

XERROR is a collection of portable FORTRAN routines which serves as a central facility for processing error messages associated with errors occurring in libraries of FORTRAN routines. Two releases of XERROR are provided, one written in American National Standard X3.9-1966 FORTRAN ar.d the other in American National Standard X3.9-1978 FORTRAN.CDC7600,6600,CYBER175 (designed to be machine-independent); FORTRAN 66 and FORTRAN 77; NOS 1.4 (CDC CYBER175); 26,000 (octal) words of memory are required to execute XERROR with the test programs provided..

25264 **(ANL/NESC—989) LCLSQ1; linear least squares with constraints.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Minkoff, M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048989.

LCLSQ1 solves linear least-squares fitting problems with or without linear equality or inequality constraints. Specifically, given a matrix C with p rows and n columns (p .GE. n) and a p-dimensional vector d, LCLSQ1 finds the n-dimensional vector x which minimizes the sum of squares in the residual vector Cx-d. Further, this vector x can be required to satisfy m linear equality and/or inequality constraints, e.g., a(i)x .GE. b(i), where a(i) is an n-dimensional row vector of coefficients and b(i) is a scalar constant. The role of constraints is particularly useful in controlling the nature of x for linear data-fitting applications.IBM303x,360,370; FORTRAN; OS/MVT; LCLSQ1 compiles and executes the sample problem in less than 180K bytes. The GO step requires 168K..

25265 **(BDX—613-2829) Visual-response indicator for bar-code-reader input. Final report.** Harte, J.R. (Bendix Corp., Kansas City, MO (USA)). Mar 1983. Contract AC04-76DP00613. 15p. NTIS, PC A02/MF A01. Order Number DE83009149.

A prototype visual-response indicator was designed, built, and tested. The indicator is designed to work in conjunction with a bar-code reader for inputting data to the Computer-Aided Cable Tracking and Updating System. The indicator was tested using simulated production operations and was found to meet all design-specification requirements.

25266 **(CONF-810546—5) IBM NJE protocol emulator for VAX/VMS.** Engert, D.E. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83008516.

From 1981 spring DECUS U.S. symposium; Miami Beach, FL, USA (18 May 1981).

Portions are illegible in microfiche products.

Communications software has been written at Argonne National Laboratory to enable a VAX/VMS system to participate as an end-node in a standard IBM network by emulating the Network Job Entry (NJE) protocol. NJE is actually a collection of programs that support job networking for the operating systems used on most large IBM-compatible computers (e.g., VM/370, MVS with JES2 or JES3, SVS, MVT with ASP or HASP). Files received by the VAX can be printed or saved in user-selected disk files. Files sent to the network can be routed to any node in the network for printing, punching, or job submission, as well as to a VM/370 user's virtual reader. Files sent from the VAX are queued and transmitted asynchronously to allow users to perform other work while files are awaiting transmission. No changes are required to the IBM software.

25267 **(CONF-820322—4) Issues in defining standards for documentation.** Gabriel, J.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007620.

From Federal information processing standards software documentation workshop; Washington, DC, USA (3 Mar 1982).

Documentation should meet the needs of several kinds of users. It should be in modules that can be strung together, so that the same information is not written in several places. The master copy should be machine readable so that a computer can help with the inevitable updates. There may be several modules dealing with the same subject at different levels of detail. In such cases it should be easy to travel vertically through a set of more detailed modules, as well as horizontally from one module to another about something different at the same technical level. All of these travel processes should be easy to perform in documentation on paper, and should be facilitated on a computer by an intelligent process that remembers frequently used paths for any given user. The computer-based travel process should have a richer set of commands than the one on paper, which is probably restricted to UP, DOWN, and SIDEWAYS, speaking in metaphorical terms.

25268 **(CONF-8110259—1) Note on cubature over a triangle of a function having specified singularities.** Lyness, J.N.; Gatteschi, L. (Argonne National Lab., IL (USA); Turin Univ. (Italy). Ist. di Calcoli Numerici). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008674.

From Numerical integration meeting; Oberwolfach, F.R. Germany (4 Oct 1981).

The conical product rules for integration over a triangle ABC are well known. In this note, we discuss conical product rules with weight function w(x)r/sup β/ where r is the distance of (x,y) from C and x is the distance of (x,y) from AB. In particular we show how to construct rules which are exact for integrand functions p/sub λ/(x,y)h/sub μ/(r) where p/sub λ/ and h/sub μ/ are polynomials of degree λ and μ, respectively.

25269 **(DOE/EI/11865—T1-Vol.1) ADP requirements study report. Volume 1. ADP requirements statement.** (One America, Inc., Washington, DC; CAP Gemini, Inc., Vienna, VA (USA)). 30 Sep 1982. Contract AC01-81EI11865. 64p. NTIS, PC A04. Order Number DE83007598.

Paper copy only, copy does not permit microfiche production.

This report details the projected ADP requirements through FY 1985 for the data center operated by the Energy Information Administration (EIA). In addition, the mission needs which drive these requirements are documented.

25270 **(DOE/EI/11865—T1-Vol.4) ADP requirements study report. Volume IV. Analysis of alternative options: projected ADP requirements.** (One America, Inc., Washington, DC; CAP Gemini, Inc., Vienna, VA (USA)). 30 Sep 1982. Contract AC01-81EI11865. 24p. NTIS, PC A02/MF A01. Order Number DE83007688.

The material presented is an analysis of alternative methods which are available to EIA for satisfying projected ADP resource requirements through FY 1985. A comparison of actual utilization for the first eight months of FY 1982 versus projected usage is provided.

25271 **(DOE/EI/11865—T1-Vol.5) ADP requirements study report. Volume V. Procurement specifications statement.** (One America, Inc., Washington, DC; CAP Gemini, Inc., Vienna, VA (USA)). 30 Sep 1982. Contract AC01-81EI11865. 46p. NTIS, PC A03/MF A01. Order Number DE83007948.

This document contains an update of the previously prepared functional specifications based on the revised requirements statement which was prepared. As a result of the study effort, it was determined that the current EIA data processing configuration will satisfy projected requirements through FY 1985. Based on this fact coupled with uncertainty in DOE's organizational structure and projected conversion impacts, it is recommended that EIA attempt to extend GSA authorization of the current configuration. However, this specification has been prepared to support EIA acquisition efforts if GSA approval for continuation of existing operations cannot be obtained. The specification is written to allow for a free and open competitive procurement in accordance with GSA guidelines.

25272 (HMI—373, pp 82-84) **Hardware developments.** Drescher, B.; Hsin-Hsin Ho; Raab, R.; Roeschert, G.; Unverdross, C.; Ziem, P. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

25273 (HMI—373, pp 85-88) **Software developments.** 1982. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83780416.

Published in summary form only.
In Scientific progress report 1981.

25274 (INIS-SU—122, pp vp) **Analytically solvable examples of account for instrumental resolution with the Pade approximation of resonance curves.** Vinogradov, V.N.; Gaj, E.V.; Rabotnov, N.S. 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83780189.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted refs.; 2 figs.
In Nuclear constants.

Fredholm integral equation of the first type with the difference kernel and a right-hand side in the form of a rational function without real poles and approximating a resonance curve is considered. The equation is solved analytically by Fourier transforms for kernels, describing three types of instrumental lines sharp exponential, smooth exponential, Lorentzian. The solution in all three cases is also a rational function.

25275 **(LA—9617-MS) Guide to MAPPER presentation graphics.** Ruhe, T. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 53p. NTIS MF A01. Order Number DE83009373.

Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted.

Important, high-quality visual aids for presentations may be made easily with the MAPPER graphics utility. The focus of discussion is on making simple, but often important, text slides quickly and easily. A detailed discussion of methods to access alternate alphabet capabilities also is presented. Subsequent brief introductions to drawing and color capabilities are given. Important tips on use and presentation methods make up the final section. Appendixes of sample results and system primers are included.

25276 **(SAND—82-2975C) High-speed maximum-entropy encoder for images.** Angel, E.S. (New Mexico Univ., Albuquerque (USA). Dept. of Electrical Engineering and Computer Science; Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 4p. (CONF-830407—2). NTIS, PC A02/MF A01. Order Number DE83008454.

From International conference on acoustics, speech, and signal processing; Boston, MA, USA (14 Apr 1983).

A simple nonlinear memory based coding system is presented whichencodes and decodes images rapidly. The nonlinear nature of the coding system allows edges to be represented well. The coding system compares favorably to predictive coders in the one to two bits per pixel range.

25277 **(SAND—83-0041) Efficient extrapolation methods for ODEs.** Shampine, L.F. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 23p. NTIS, PC A02/MF A01. Order Number DE83009390.

Gragg proposed a way of solving the initial value problem for a system of ordinary differential equations (ODEs) which is based on repeated extrapolation of the explicit midpoint rule. To advance the integration of $y' = f(x, y)$ from an approximation y_0 to $y(x_0)$ to an approximation of $y(x_0 + H)$, one must repeatedly select an integer n/sub i/ and integrate from x_0 to $x_0 + H$ using the midpoint rule and a step size h/sub i/ = H/n/sub i/. The approximations to $y(x_0 + H)$, which are of order two, can be combined in a linear (polynomial extrapolation) or a nonlinear (rational extrapolation) way to form high order approximations. If polynomial extrapolation is done, this process amounts to a convenient way of constructing explicit Runge-Kutta formulas of increasing order. Bulirsch and Stoer worked out the many practical details involved in turning the basic idea into a code. The resulting code and its successors are so effective that extrapolation of the explicit midpoint rule is one of the most popular ways to solve the initial value problem for ODEs. Each of the Runge-Kutta formulas generated by the extrapolation process depends on the sequence [n/sub i/] selected. There are several criteria for selecting a sequence, such as the number of evaluations of f made (the number of stages of the Runge-Kutta formula), the absolute stability, and the efficiency of the resulting formula. In this paper we consider the efficiency as it is affected by the choice of [n/sub i].

25278 **(SAND—83-0132) Stored-data acquisition system.** Hauser, G.C.; Ryerson, D.E. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 37p. NTIS, PC A03/MF A01. Order Number DE83009384.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

This report describes a simple inexpensive data-acquisition system with the data stored in memory for ead out after test completion and recovery of the test unit. The system is a general-purpose device with eight analog input channels feeding an eight-bit analog-to-digital converter operating at speeds to 4000 samples per second. The system is controlled by a microprocessor to allow easy adaptation to different data-acquisition tasks with only software changes.

25279 **(UCID—19681) QUIKIE: a plotting routine to produce quick and easy graphs. Reference manual.** Strout, R.E. II. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 22p. NTIS, PC A02/MF A01. Order Number DE83009356.

QUIKIE is a plotting routine to produce quick and easy two-dimensional data graphs. QUIKIE allows the user to produce basic black and white or color graphs and display them on a TMDS monitor. The capability for production of presentation quality graphs is also provided. The user may overlay two or more data sets upon the same graph, allowing comparison or validation of the data. Graphic information is stored in a UX80 plot-file which can then be sent for processing to a RJET printer, TMDS monitor, high resolution hardcopy or viewgraph, or FR80/DICOMED generated film.

25280 **Painleve property for partial differential equations.** Weiss, J.; Tabor, M.; Carnevale, G. (Center for Studies of Nonlinear Dynamics, La Jolla Institute, La Jolla, California 92038). *Journal of Mathematical Physics (New York);* **24**: No. 3, 522-526(Mar 1983).

In this paper we define the Painleve property for partial differential equations and show how it determines, in a remarkably simple manner, the integrability, the Baecklund transforms, the linearizing transforms, and the Lax pairs of three well-known partial differential equations (Burgers' equation, KdV equation, and the modified KdV equation). This indicates that the Painleve property may provide a unified description of integrable behavior in dynamical systems (ordinary and partial differential equations), while, at the same time, providing an efficient method for determining the integrability of particular systems.

25281 **QDF misclassification probabilities for known population parameters.** Bayne, C.K. (Union Carbide Corp., Oak Ridge, TN); Tan, W.Y. *Communications in Statistics, (Part A), Theory and Methods;* **10**: No. 22, 2315-2326(1981).

Approximated QDF misclassification probabilities have been derived for bivariate normal populations with known parameter values. The effect of unequal covariances and population distance on the misclassification probabilities are examined.

9903 Information Handling

REFER ALSO TO CITATION(S) 23051, 23079, 25270

25282 **(DOE/IG—105) Public access to classified reports at the Los Alamos Scientific Laboratory.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 26 Mar 1980. 67p. TIC. Order Number DE83006127.

Report to the Secretary, Deputy Secretary.

Circumstances surrounding the discovery of UCRL-4725, a nuclear weapons report, on the open shelves of a LASL public library are discussed. Instances of erroneous use of declassification marking are documented in the report series that included the above report. However, no staff person had checked for similar mistakes in declassification. Recommendations are presented to move this unclassified report to its vault for classified materials and that the person responsible for LASL's failure to report to DOE the security violations be disciplined. Comments to the draft report are appended. (PSB)

25283 **(DOE/NBM—3008953) Information protection and control.** Spath, C.E. (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). 20 Jan 1981. 17p. NTIS, PC A02/MF A01. Order Number DE83008953.

Portions are illegible in microfiche products.

This summary defines information protection and control as the government's legitimate role in determining the availability and accessibility of certain information and its responsibility for protecting and controlling that information. It identifies the principle issues, problems and impacts, gives a current status overview, states energy related issues and DOE involvement, gives key references and includes a bibliography of related references. (GHT)

25284 **(DOE/TIC—3008728) Information for technology innovation. Summary paper.** Stuber, C.E. (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). 20 Jan 1981. 14p. NTIS, PC A02/MF A01. Order Number DE83008728.

Research and development are integral parts of the innovation process, but they make no economic contribution unless the knowledge generated is integrated into the production process or manifested in a new or improved product that is sold on the market. Successful innovation depends in a large part on the effective integration of market and technical information by the innovating organization. Various Congressional and Executive actions have been taken in the last few years to enhance technology transfer and information transfer to assist in the process. The DOE Technical Information Center has the following ongoing programs to promote innovation through increased information availability: (1) a technology-transfer program to announce information, devices, or processes with potential application in industry; (2) bilateral and multilateral information-exchange agreements to acquisition the international energy-related information; (3) a computerized Technical Information Management System to ensure proper and timely reporting of DOE-sponsored R and D information; (4) a computerized Research in Progress retrieval system containing information about DOE ongoing research projects; (5) a computerized Energy Data Base retrieval system containing information on all foreign and domestic energy-related R and D; and (6) a series of publications to announce all energy-related R and D information. Also the Office of Energy Research, DOE Headquarters, is coordinating the technology transfer program of the DOE Federal Laboratories.

25285 **(DOE/TIC—3008954) Transborder flow of information. Summary paper.** Stuber, C.E. (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). 20 Jan 1981. 20p. NTIS, PC A02/MF A01. Order Number DE83008954.

Transborder data flow or transnational data flow connotes the process or act of moving information across national borders. This summary paper is not restricted to data intended for processing and storage in automated data-processing systems, but includes the communication and use of information in the very widest sense, covering all forms of recorded and transmitted information expressed in graphic, written, spoken, electronic, printed, recorded, and film form. Categories of information flow include production and distribution control, financial management and planning, travel reservations, scientific research and development, environmental monitoring, financial transactions, personnel and payroll data, government and public authority data, etc. The issues and problems involved tend to focus on digitally-coded, computer-processed information, but the concerns apply generally to all forms of recorded and transmitted data, particularly in the case of scientific and technical information. News-gathering activities and general communications, however, are considered outside the scope of the present discussion.

25286 **(NASA-SP—7043(29)) Energy: a continuing bibliography with indexes (issue 29).** (National Aeronautics and Space Administration, Washington, DC (USA)). Apr 1981. 420p. NTIS, PC $15.00.

This bibliography lists 1360 reports, articles, and other documents introduced into the NASA scientific and technical information system from January 1, 1981 through March 31, 1981.

25287 **(DOE/EI/11865—T1-Vol.3-App.E) ADP requirements study report. Volume III. Appendix E.** (One America, Inc., Washington, DC; CAP Gemini, Inc., Vienna, VA (USA)). 30 Sep 1982. Contract AC01-81EI11865. 284p. NTIS, PC A13. Order Number DE83007783.

Paper copy only, copy does not permit microfiche production.

The justification is given for the FY 1982/FY 1983 requirements for data processing in the Energy Information Administration. This justification is presented in terms of project needs; that is, ADP support requirements are tied to specific organizations, objectives, and mandates. (GHT)

25288 (DOE/EI/11865—T1-Vol.2-A-D) ADP Requirements Study Report. Volume II. Appendices A, B, C and D. (One America, Inc., Washington, DC; CAP Gemini, Inc., Vienna, VA (USA)). 30 Sep 1982. Contract AC01-81EI11865. 128p. NTIS, PC A07. Order Number DE83007944.

Paper copy only, copy does not permit microfiche production.

The appendices describe data base management systems supported by the EIA computer center and their usage, and the detailed FY 1981 computer utilization baseline for the EIA center. A listing of ADP usage by organization and project within the EIA is given. The current organization structure of the EIA is described, including support services provided by EIA personnel, and performance of optimization techniques designed to achieve maximum computer usage and throughput. (GHT)

CORPORATE AUTHOR INDEX

In the Corporate Index, report literature is indexed using the name of the organization or institution responsible for issuing the report. Headings are provided for all report literature and for published literature for which a corporate approach is especially desirable, e.g., symposium and conference proceedings.

Each entry under a corporate heading gives the document title and the volume and abstract numbers. The document type, e.g., R for Report; country of publication, e.g., US; and language of the document, e.g., In German; are given in parentheses at the end of the entry. If no language statement appears, the language is English. Tables of document types and country of publication codes appear after the indexes.

DOE Energy Information Data Base: Corporate Author Entries (DOE/TIC-4585) is used in the standardization of corporate entries. DOE/TIC-4585 is available for purchase from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, Virginia 22161.

A

Academia Sinica, Beijing (China). Inst. of High Energy Physics
Performance of a high-pressure-hydrogen time-projection chamber, 8:24196 (R;US)

Aerospace Corp., El Segundo, CA (USA)
Theory of the auroral magnetosphere, 8:24509 (R;US)

Ahern-MacVittie-Hofmann and Goodwin Architects Ltd., Tempe, AZ (USA)
Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report, 8:23320 (R;US)

Alabama Univ., Huntsville (USA). Kenneth E. Johnson Environmental and Energy Center
Rate guide for residential No. 2 heating oil and coal for SOLCOST Data Bank cities, 8:23001 (R;US)

Alabama Univ., University (USA). Dept. of Chemical and Metallurgical Engineering
Chemical feedstocks from wood: aqueous organic alcohol treatment, 8:23263 (R;US)

Alexander Associates, Ambler, PA (USA)
Environmental and health aspects of waste-to-energy systems, 8:24402 (R;US)

Allied-General Nuclear Services, Barnwell, SC (USA)
Rack test and facility enhancement program, 8:23115 (R;US)

Altas Corp., Santa Cruz, CA (USA)
Development of an advanced solar augmented water heater. Final report Feb 80-May 82, 8:23324 (R;US)

American Nuclear Society, Lynchburg, VA. Virginia Section
LWR extended burnup: fuel performance and utilization, 8:23448 (R;US)
LWR extended burnup: fuel performance and utilization, 8:23458 (R;US)

American Public Works Association, Washington, DC
Resource-recovery option in solid-waste management: a review guide for public officials, 8:23875 (R;US)

Ames Lab., IA (USA)
ELLIPTIC; elliptic integrals by duplication, 8:25262 (R;US)
Fermi-surface properties of $CeSn_3$ and related compounds, 8:23947 (R;US)
Selective magnetic enhancement of pyrite in coal by dielectric heating, 8:22991 (R;US)

AN Ukrainskoj SSR, Kiev. Inst. Ehlektrodinamiki
Electron flow generation of energy in a field of two transverse electromagnetic type waves. Preprint 218, 8:24750 (R;UA)

Applied Decision Analysis, Inc., Menlo Park, CA (USA)
Analysis of power-plant-construction lead times. Volume 1. Analysis and results, 8:23419 (R;US)

Applied Management Sciences, Inc., Silver Spring, MD (USA)
Pacific Northwest regional energy planning Module III: policy options and programs. Development of standards and program packages. Volume II. Technical report. Final report, Phase 2, 8:23719 (R;US)
Pacific Northwest regional energy planning module III: policy options and programs. Development of standards and program packages. Volume I. Summary. Final report, Phase 2, 8:23693 (R;US)

Argonne National Lab., Idaho Falls, ID (USA)
Role of mockup testing in the Hot Fuel Examination Facility remote operations, 8:24103 (R;US)

Argonne National Lab., IL (USA)
0^- to 0^+ beta decay in A = 16, 8:24644 (R;US)
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R;US)
Advanced intake technology for cooling-water intakes: current status and future direction, 8:23409 (R;US)
Advanced pressurized fluidized-bed combustion, 8:24150 (R;US)
Alternate-fuel reactor studies, 8:24817 (R;US)
Analyses with the FSTATE code: fuel performance in destructive in-pile experiments, 8:23588 (R;US)
Analysis of proposed legislation to control acid rain, 8:24255 (R;US)
Analysis of recent fuel-disruption experiments, 8:23589 (R;US)
Analysis of short-rotation forests using the Argonne model for selecting economic strategy (MOSES), 8:23256 (R;US)
Analysis of the separation of protium from blanket tritium-product streams, 8:24825 (R;US)
Application of debris-bed dryout data to CONACS-1 modeling, 8:23599 (R;US)
Application of polyalgorithmic optimization to MHD power plant design, 8:23771 (R;US)
Applications of the DC-relaxation technique in Li-Al/FeS cell development, 8:23677 (R;US)
Approach to modelling vegetation yield reduction from point-source emissions of sulfur dioxide, 8:24400 (R;US)
Argonne Energy Model - Portugal, 8:23692 (R;US)
Assessment of cool storage in commercial building applications, 8:23664 (R;US)
ATM; atmospheric transport & diffusion model, 8:24227 (R;US)
Atomic defects and diffusion in metals, 8:23936 (R;US)
^{11}B study of spin dynamics in Y/sub 1-x/RE/sub x/Rh_4B_4, 8:23999 (R;US)
Band model for d- and f-metals, 8:23946 (R;US)
Batteries for electric vehicles, 8:23885 (R;US)
Batteries for load leveling, 8:23408 (R;US)
BEACON/MOD3; containment system fluid flow, 8:23579 (R;US)
Beam-foil spectroscopy at Argonne National Laboratory, 8:24517 (R;US)
Calculation of thermophysical properties of sodium, 8:23516 (R;US)
Case for electricity: an applications approach, 8:23728 (R;US)
Characterization of defects in metals by positron-annihilation spectroscopy, 8:23953 (R;US)
CHART; iodine decay heat on charcoal adsorbers, 8:23583 (R;US)
Cogeneration and emission offsets in nonattainment areas, 8:23700 (R;US)
COMB; 1-dimensional high-temperature coal combustor model, 8:23765 (R;US)
Common problems in modeling of thermal plumes in air and water, 8:24252 (R;US)
Community energy audit: a discussion of process, resources, and potential problems, 8:23754 (R;US)
Computer optimization of landfill-cover design, 8:23871 (R;US)
COMRC1; slag transport models for MHD systems, 8:23766 (R;US)

Conceptual design of the INTOR first-wall system, 8:24823 (R;US)
CONF; conference attendee & speaker data file, 8:25254 (R;US)
Content of local-energy-management programs, 8:23703 (R;US)
Control of energy transfer with an inductor-convertor bridge, 8:24102 (R;US)
Corrosion problems associated with solar fluid and components, 8:23315 (R;US)
Current status of the lithium/metal sulfide system, 8:23678 (R;US)
Current-pulse measurements of Li-Al/FeS cells, 8:23675 (R;US)
DAP; deuterium depth profile in uniform solids, 8:23993 (R;US)
Data acquisition system for the neutron scattering instruments at the intense pulsed neutron source, 8:24172 (R;US)
Demonstration tokamak-power-plant study (DEMO), 8:24816 (R;US)
DENDRO; hierarchical cluster analysis of data, 8:25255 (R;US)
Development of the rf linear accelerator test bed for heavy-ion fusion, 8:24822 (R;US)
Diffusion mechanisms in transition-metal oxides, 8:23995 (R;US)
Direct solar steam-generating system, 8:23316 (R;US)
Disaggregation, input-output analysis, and energy impacts, 8:23685 (R;US)
DISPL1; 1- and 2-dimensional kinetics-diffusion partial differential equations solution, 8:24569 (R;US)
DN detection during SLSF tests, 8:23587 (R;US)
DOE/ANL/HTRI heat-exchanger-tube vibration data bank, 8:23846 (R;US)
DPOLE; helmholtz equation on general 3-dimensional region, 8:25246 (R;US)
DRIFT; cooling tower drift eliminator analysis, 8:23399 (R;US)
DSNP; dynamic simulation nuclear power plants, 8:23539 (R;US)
Economic evaluation of competing industrial waste-heat-recovery technologies, 8:23856 (R;US)
Effect of NO_2 and SO_2 alone and in combination on the productivity of field-grown soybeans, 8:24406 (R;US)
Effect of particle stratification on debris-bed dryout, 8:23598 (R;US)
Effect of reduced enrichment on the fuel cycle for research reactors, 8:23576 (R;US)
Effect of secondary combustion on nitric oxide concentrations in a MHD combustion gas, 8:23767 (R;US)
Effects of irradiation on ceramics for fusion-reactor applications, 8:23992 (R;US)
Effects of resonances in molecular photoionization measured with triply differential photoelectron spectroscopy, 8:24519 (R;US)
Electrode characterization of Li-Al/FeS cells, 8:23674 (R;US)
Electronic structure and formation energy of a vacancy in aluminum, 8:23937 (R;US)
Electrostatically augmented gas-cleanup devices for particular removal, 8:22947 (R;US)
Environmental and health aspects of waste-to-energy systems, 8:24402 (R;US)
Environmental monitoring considerations for low-level waste disposal sites, 8:23183 (R;US)
Evaluation of structural integrity of IPNS-I and ZING-P' targets, 8:24171 (R;US)
EVITS; steady state two-dimensional fluid flow, 8:24568 (R;US)
Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory, 8:23595 (R;US)
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium, 8:23596 (R;US)
Exploratory and basic fluidized-bed combustion studies. Annual report, October 1980-September 1981, 8:24148 (R;US)
Fermi-surface properties of $CeSn_3$ and related compounds, 8:23947 (R;US)
Flow-induced vibration of a curved tube array subject to liquid cross flow, 8:23469 (R;US)
Forecasts of intercity passenger demand and energy use through 2000, 8:23843 (R;US)
Formation energy of point defects in free surfaces and grain boundaries in MgO, 8:24000 (R;US)
FUELS DATA; model verification fuel rod data, 8:23446 (R;US)
GASPAR; evaluation of atmospheric releases, 8:24248 (R;US)
Getting metal-hydrides to do what you want them to, 8:23215 (R;US)
Heat transfer in slagging MHD radiant boilers, 8:23770 (R;US)
Hydrides of oxygen-stabilized intermetallic phases, 8:23998 (R;US)
Hydrogen absorption and temperature programmed desorption (TPD) studies of iron- and chromium-substituted ZrV_2, 8:23214 (R;US)
Hyperfine structures of the nd $^1D(n = 3 - 8)$ states of ^3He I, 8:24518 (R;US)
IBM NJE protocol emulator for VAX/VMS, 8:25266 (R;US)
ICOP; financial model industrial cogeneration, 8:23406 (R;US)
Important material considerations in INTOR, 8:24820 (R;US)
Improved method for predicting seasonal and annual shadowing from cooling-tower plumes, 8:24401 (R;US)
Influence of detector geometry on AEM-based x-ray microanalysis. I. Theoretical, 8:24046 (R;US)
Initiation and development of deformation heterogeneities in superplastic materials, 8:24739 (R;US)
Interaction and penetration of heated UO_2 with limestone concrete, 8:23597 (R;US)
Intercomparison of MAP3S models of long-range transport and deposition, 8:24231 (R;US)
Interstitial site occupation in ZrNiH, 8:23997 (R;US)
Ion-bombardment-induced subsurface composition modifications in alloys at elevated temperatures, 8:23932 (R;US)
IP2D.REV1; resistivity & induced-polarization, 8:23367 (R;US)
IPNS distributed-processing data-acquisition system, 8:24173 (R;US)
Isotope correlations for safeguards surveillance and accountancy methods, 8:23190 (R;US)
Issues in defining standards for documentation, 8:25267 (R;US)
10-kA pulsed power supply for superconducting coils, 8:24821 (R;US)
Key features of INTOR nuclear systems, 8:24819 (R;US)
LADTAP2; liquid pathway dose calculations, 8:24293 (R;US)
Landfill gas recovery in the USA, 8:23873 (R;US)
LCLSQ1; linear least squares with constraints, 8:25264 (R;US)
Linear transport theory and an indefinite Sturm-Liouville problem, 8:24722 (R;US)
LINPACK; simultaneous linear algebraic equations, 8:25242 (R;US)
Local-government energy-conservation programs and their impact on rental buildings, 8:23704 (R;US)
L2RMAT; coupled channel inelastic scattering, 8:24747 (R;US)
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R;US)
Materials engineering of metal hydrides, 8:23216 (R;US)
Mathematical model for evaluating the suitability of a low-level radioactive waste site, 8:23119 (R;US)
Mathematical modelling of thermal-plume interaction at Waterford Nuclear Power Station, 8:23573 (R;US)
Metamagnetism of palladium, 8:23894 (R;US)
Midwest region energy outlook, 8:23686 (R;US)
Mission analysis of second cars to determine electric-vehicle suitability, 8:23883 (R;US)
Modeling industrial-boiler retirement economics, 8:23696 (R;US)
Molecular dynamics studies of superionic conductors, 8:24031 (R;US)
Molecular-dynamics simulation of displacement cascades in Cu: analysis of replacement sequences, 8:23934 (R;US)
Molecular-dynamics study of 2-D melting: long-range potentials, 8:24520 (R;US)
NALAP; LMFBR transient response to accident, 8:23581 (R;US)
Neutronic analysis of graphite-moderated solid breeder design for INTOR, 8:24824 (R;US)
New data on the heat capacity of liquid ^3He, 8:24570 (R;US)
New method for the preparation of fast-conducting, reactive-glass systems, 8:24029 (R;US)
NJE; VAX-VMS IBM NJE network protocol emulator, 8:25260 (R;US)
NONSAP-C; nonlinear stress concrete structures, 8:24026 (R;US)
Note on cubature over a triangle of a function having specified singularities, 8:25268 (R;US)
NUBOW-2D Inelastic; bowed reactor core analysis, 8:23514 (R;US)
Nuclear forces and nuclear matter including pions and isobars, 8:24703 (R;US)
Nuclear power industry, 1981, 8:23442 (R;US)
Observation of a first-order phase transition in single-crystal $ErRh_4B_4$ at H/sub c2/, 8:24002 (R;US)
OCOPTR;DRVOCR; unconstrained optimization, 8:25233 (R;US)
Off-design study of an open cycle MHD power plant with oxygen enrichment, 8:23769 (R;US)
On-line laser spectroscopy with a cooled He-jet transport system, 8:24174 (R;US)
Optical observations of molecular dissociation in thin foils, 8:24514 (R;US)
OPTIMIZERS; nonlinear optimization subroutines, 8:25252 (R;US)

Organisms and compounds of unnatural isotopic composition in NMR, 8:24348 (R;US)
Organizational approach to estimating public resistance at proposed disposal sites for radioactive and hazardous wastes, 8:23120 (R;US)
Ostwald ripening of precipitates and irreversible phenomena, 8:24056 (R;US)
Overview of boom towns and construction efficiency interactions, 8:23697 (R;US)
Patterns of change in the business community of energy boomtowns, 8:23698 (R;US)
PDEONE; solutions of partial differential equations, 8:25239 (R;US)
Performance advantages of a gas-stream MHD retrofit, 8:23772 (R;US)
Performance of a 10-cell LiAl/metal sulfide battery, 8:23672 (R;US)
Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior, 8:23601 (R;US)
PFR/TREAT CO1 and LO1 experiments, 8:23593 (R;US)
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R;US)
Phenomenological studies of HCDA issues, 8:23594 (R;US)
Photoelectron spectrometer for high-resolution angular resolved studies, 8:24209 (R;US)
Physical engineering and environmental aspects of ocean kelp farming. Final report, January 1982-September 1982, 8:23257 (R;US)
Positron annihilation in solid and liquid Ni, 8:23940 (R;US)
Positron prevacancy effects in pure annealed metals, 8:23893 (R;US)
Positron-annihilation characteristics in real solids including many-body enhancement effects, 8:24721 (R;US)
Positron-annihilation measurements of vacancy formation in Ni and Ni(Ge), 8:23941 (R;US)
Positron-annihilation spectroscopy of vacancy defects in aluminum, 8:23939 (R;US)
Positron-annihilation study of the equilibrium vacancy ensemble in aluminum, 8:23942 (R;US)
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R;US)
PROSA2; probabilistic response surface studies, 8:23580 (R;US)
PTA1; pipe system pressure analysis, 8:23510 (R;US)
PUBG; purex solvent extraction process model, 8:23111 (R;US)
PWR systems transient analysis: a reactor-safety perspective, 8:23600 (R;US)
Radium dial workers, 8:24364 (R;US)
RANDOM NUMBERS; obtained from U235 alpha decay, 8:25256 (R;US)
Re-examination of the threshold energy surface in copper, 8:23935 (R;US)
Regional analysis of potential impacts of electric and hybrid vehicles on electric utilities, 8:23729 (R;US)
Release of fission products from irradiated aluminide fuel at high temperature, 8:23604 (R;US)
Residential fuel comparison patterns for poor, black, and elderly households: a comparative study. Vol I. Data base development, 8:23793 (R;US)
Resonances in s-d shell nuclei, 8:24651 (R;US)
Review of the effects of the Clean Water Act on cooling-system selection by the steam-electric industry, 8:23427 (R;US)
Risk estimates for bone, 8:24363 (R;US)
RO75; reverse osmosis desalting plant design, 8:24093 (R;US)
Role of the breeder in long-term energy economics, 8:23701 (R;US)
Scaling criteria for LWR's under single-phase and two-phase natural circulation, 8:23603 (R;US)
SCHAFF; heat & water transfer in porous media, 8:23362 (R;US)
Segregation in irradiated titanium alloys, 8:23931 (R;US)
Selection of low-risk design guidelines for energetic events, 8:23591 (R;US)
Shell structure at high spin and the influence on nuclear shapes, 8:24681 (R;US)
Simulation of thermal-transient-induced-pipe-flow stratification using COMMIX-2, 8:23542 (R;US)
SLACKLY; 1-dimensional multicavity klystron tube analysis, 8:24166 (R;US)
SLGTR; slag transport models for duct surfaces, 8:23764 (R;US)
Socio-technical scenarios for long-range transportation technology comparisons, 8:23841 (R;US)
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R;US)
SOLA-DF; transient 2-dimensional 2-phase flow, 8:24136 (R;US)
Solar liquid-metal MHD performance predictions, 8:23299 (R;US)
SOLTES1; thermal energy systems simulation, 8:23663 (R;US)
Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R;US)
Some specialized radiological-safety considerations at Argonne National Laboratory's Heavy Ion Research Facility (SAR, Shielding Design, Q.F.'s, HIRC), 8:24175 (R;US)
Spectroscopic properties of the f-elements in compounds and solutions, 8:24078 (R;US)
Sputter-induced erosion of alkali metal surfaces - AES, XPS and SIMS studies, 8:24759 (R;US)
SPXCPL; two-dimensional modeling of self-potential effects, 8:23366 (R;US)
Standardized test methods for investigating attrition and elutriation characteristics of natural sorbents in fluidized-bed coal combustors, 8:24149 (R;US)
Start-up and performance of a high-sulfur dry-scrubber system, 8:22946 (R;US)
Static-mode laser-fluorescence spectroscopy: a new technique for studying excitation mechanisms in particle-surface collisions, 8:24521 (R;US)
Status and validation of the SAS4A accident-analysis code system, 8:23592 (R;US)
Status of fast-breeder-reactor safety, 8:23602 (R;US)
Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program, 8:23676 (R;US)
Storing solar energy in thermally stratified tanks, 8:23356 (R;US)
Structure and conductivity of the NASICON analog $Na_3SC_2(PO_4)_3$, 8:24058 (R;US)
Structures for common-cause failure analysis, 8:23586 (R;US)
Study of coexistence of ferromagnetism and superconductivity in single-crystal $ErRh_4B_4$, 8:23996 (R;US)
Successes and failures of the constituent quark model, 8:24605 (R;US)
Superconductivity in Au-Cr-Au and Ag-Pd-Ag epitaxial metal film sandwiches, 8:23944 (R;US)
Surface segregation in concentrated Ni-Cu alloys under irradiation, 8:23943 (R;US)
SWIFT; waste-isolation flow & transport model, 8:23377 (R;US)
Terminal lens for an FN tandem, 8:24159 (R;US)
Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations, 8:23605 (R;US)
Three-dimensional thermal modeling of eV batteries, 8:23884 (R;US)
Threshold energy surface and Frenkel-pair resistivity for Cu, 8:23948 (R;US)
TIMEX; 1-dimensional time-dependent multigroups discrete ordinates, 8:24717 (R;US)
Tokamak reactor cost model based on STARFIRE/WILDCAT costing, 8:24818 (R;US)
Tube crossflow force measurements, 8:23541 (R;US)
TVENT; ventilation system transient analysis, 8:24089 (R;US)
U-25B MHD-generator performance, 8:23768 (R;US)
UDAD; uranium dispersion & dosimetry model, 8:23187 (R;US)
US RERTR program, its fuel-development activities, and application in the KUHFR, 8:23575 (R;US)
Using an electrostatic accelerator to determine the stereochemical structures of molecular ions, 8:24516 (R;US)
UV-laser photofragmentation of a 2-MeV H_2^+ beam, 8:24515 (R;US)
Vacancy formation in Ni and Ni(Ge), 8:23933 (R;US)
Vapor pressures and vapor compositions in equilibrium with hypostoichiometric plutonium dioxide at high temperatures, 8:24001 (R;US)
VIVAS2; A-BC exact coupled channel scattering, 8:24513 (R;US)
Wet and dry surface deposition of air pollutants and their modeling, 8:24230 (R;US)
XERROR; Fortran library error-handling package, 8:25263 (R;US)
XPS study of CaO in sodium silicate glass, 8:24030 (R;US)

Arizona State Univ., Tempe (USA)
Analytical and experimental investigations of sodium heat pipes and thermal energy storage systems. Final report oct 80-sep 81, 8:24083 (R;US)

Army Engineer Waterways Experiment Station, Vicksburg, MS (USA). Geotechnical Lab.
Trench design and construction techniques for low-level radioactive waste disposal, 8:23155 (R;US)

Artec Associates, Inc., Hayward, CA (USA)
High power pulsed plasma MHD experiments. Annual report 1 Jan 81-30 Sep 82, 8:23763 (R;US)
Ashland Synthetic Fuels, Inc., KY (USA)
Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R;US)
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R;US)
Atkinson, Dwyer and Klemin, Bismarck, ND (USA)
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis, 8:23232 (R;US)
Atomic Energy Board, Pelindaba, Pretoria (South Africa)
PELSHIE2; point kernel integration shielding, 8:24720 (R;US)
Atomics International Div., Canoga Park, CA (USA)
SOMIX1; sodium spray fires in cylindrical cell, 8:23508 (R;US)
Australian Atomic Energy Commission, Sutherland
BENDPAC; stress analysis of flanged pipe bends, 8:24099 (R;US)
Australian Coal Industry Research Labs. Ltd., North Ryde
Investigations into monolithic pump packing as a means of underground roof support. Part B: field trials at South Bulli 'B' Mine and mathematical modelling, 8:22967 (R;AU)

B

Babcock and Wilcox Co., Alliance, OH (USA). Research and Development Div.
Computational tools for pulverized-coal combustion. Sixth quarterly report, July 1982-September 1982, 8:22999 (R;US)
Babcock and Wilcox Co., Alliance, OH (USA). Research Center
Examination of Tube Samples 21-46 and 28-45 from the Ginna Nuclear Plant for intergranular attack, 8:23500 (R;US)
Babcock and Wilcox Co., Lynchburg, VA (USA)
Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982, 8:23473 (R;US)
Babcock and Wilcox Co., Lynchburg, VA (USA). Lynchburg Research Center
EPRI/B and W cooperative program on PWR fuel-rod performance. Final report, 8:23498 (R;US)
Battelle Columbus Labs., OH (USA)
HAARM3; aerosol behavior log-normal dist model, 8:23582 (R;US)
Inorganic compound identificatioon of fly ash emissions from municipal incinerators. Final report, 8:24051 (R;US)
Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation
Technical progress report for the quarter 1 January-31 March 1982, 8:23156 (R;US)
Battelle Pacific Northwest Labs., Richland, WA (USA)
Development and characterization of electric power conservation and supply resource planning options, 8:23717 (R;US)
Intercomparison of MAP3S models of long-range transport and deposition, 8:24231 (R;US)
Bayerische Landesanstalt fuer Landtechnik, Freising (Germany, F.R.)
Straw processing, 8:23864 (R;DE;In German)
Bechtel Northern Corp., Gaithersburg, MD (USA)
Quick Look inspection: report on the insertion of a camera into the TMI-2 reactor vessel through a leadscrew opening, 8:23504 (R;US)
Beck (R.W.) and Associates, Denver, CO (USA)
BECKDRY; dry cooling for steam-electric plants, 8:23398 (R;US)
Bell Telephone Labs., Inc., Murray Hill, NJ (USA)
Influence of detector geometry on AEM-based x-ray microanalysis. I. Theoretical, 8:24046 (R;US)
Bendix Corp., Kansas City, MO (USA)
ADVCON; advance control 93 APT postprocessor, 8:24095 (R;US)
ANOVA; three factor analysis of variance, 8:25247 (R;US)
BXAMER; hustler two-axis lathe APT postprocessor, 8:24097 (R;US)
Cable-positioning fixtures. Final report, 8:24101 (R;US)
OKUMA; OKUMA two-axis lathe APT postprocessor, 8:24098 (R;US)
PTTOPT; point-to-point tool APT postprocessor, 8:24096 (R;US)
Visual-response indicator for bar-code-reader input. Final report, 8:25265 (R;US)
Bendix Field Engineering Corp., Grand Junction, CO (USA)
Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23098 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R;US)
Black and Veatch, Kansas City, MO (USA)
Solar Pilot Plant Phase I, detailed design report: thermal storage subsystem research experiment. CDRL Item No. 8 (Approved), 8:23303 (R;US)
Bochum Univ. (Germany, F.R.). Abt. Maschinenbau und Konstruktiven Ingenieurbau
Yield of the oxidation of very rarefied propane/air mixtures in catalytic fluidized beds, 8:24571 (R;DE;In German)
Boeing Computer Services Co., Seattle, WA (USA)
Intermediate photovoltaic system application experiment operational performance report. Volume 14. For Beverly High School, Beverly, Massachusetts for October 1982, 8:23293 (R;US)
Intermediate photovoltaic system application experiment operational performance report. Volume 15. For Beverly High School, Beverly, MA for November 1982, 8:23294 (R;US)
Intermediate photovoltaic system application experiment operational performance report. Volume 16. For Beverly High School, Beverly, MA for December 1982, 8:23295 (R;US)
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Direct determination of the quark density ratio d(x)/u(x) in the proton from νp and anti νp interactions, 8:24604 (R;DE)
Particle-two particle interaction in configuration space, 8:24748 (R;DE)
Relations between irreducible representations of the hyperoctahedral group and O(4) and SO(4), 8:24630 (R;DE)
Results from PETRA, 8:24575 (R;DE)
Test of three-body separable pole expansions at negative and positive energies, 8:24749 (R;DE)
Booz, Allen and Hamilton, Inc., Cleveland, OH (USA)
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R;US)
Boyd (John T.) Co., Pittsburgh, PA (USA)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VIII. Coal quality analysis, 8:23236 (R;US)
Brandeis Univ., Waltham, MA (USA). Dept. of Physics
Positron-annihilation spectroscopy of vacancy defects in aluminum, 8:23939 (R;US)
Positron-annihilation study of the equilibrium vacancy ensemble in aluminum, 8:23942 (R;US)
British Carbonization Research Association, Chesterfield
Moisture determination by microwave heating, 8:22941 (R;GB)
The influence of tar and pitch additions to caking coals on the anisotropic composition and microstrength of coke, 8:22911 (R;GB)
Brookhaven National Lab., Upton, NY (USA)
1982 breeding bird censuses and summary of 1977-1982 results, 8:24266 (R;US)
Application of reduction methods to nuclear power plant structures, 8:23634 (R;US)
BECOM-BNL; buildings energy optimization model, 8:23795 (R;US)
Development of a fully synthetic tape insulation for lapped power cables, 8:23432 (R;US)
Energy storage via the carbothermic reduction of sodium oxide, 8:23667 (R;US)
Intercomparison of MAP3S models of long-range transport and deposition, 8:24231 (R;US)
Photovoltaic energy systems: environmental concerns and control technology needs, 8:23277 (R;US)
Radioactively induced noise in gas-sampling uranium calorimeters, 8:24195 (R;US)
Solidification of oils and organic liquids, 8:23118 (R;US)
Some basic questions in organic superconductivity, 8:24028 (R;US)
Theory of anion ordering in TMTSF compounds, 8:24027 (R;US)
Very small ionization pressure gauge, 8:24144 (R;US)

Brown Boveri Electric, Inc., Chalfont, PA (USA)
Metal-oxide surge arresters for gas-insulated systems, Phases I and II. Final report, 8:23438 (R;US)
Brown, Boveri und Cie A.G., Heidelberg (Germany, F.R.). Zentrales Forschungslabor
Latent heat storage for solar energy systems, 8:23357 (R;XE;GE)
Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)
10 kW - solar power station and power plant optimizing, 8:23298 (R;DE;In German)
20 kW fuel cell units of compact assembly. Pt. 3, 8:23786 (R;DE;In German)
20 kW fuel cell units of compact assembly. Pt. 6, 7, 8:23789 (R;DE;In German)
20 kW fuel cell units of compact design. Pt. 1, 2, 8:23785 (R;DE;In German)
20 kW-fuel cell units by compact assembly. Pt. 4, 8:23787 (R;DE;In German)
20 kW-fuel cell units of compact assembly. Pt. 5, 8:23788 (R;DE;In German)
Bipolar lead accumulator cell with high energy density, 8:23671 (R;DE;In German)
Catalysts and relations of selectivity for the Fischer-Tropsch-Synthesis, 8:22915 (R;DE;In German)
Connection between air permeability of joints of windows and exchange of air in the room, 8:23801 (R;DE;In German)
Development and integration of operational planning models for the coal mining industry in the Federal Republic of Germany (short title: Mining planning models), 8:22971 (R;DE;In German)
Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system, 8:23351 (R;DE;In German)
Development of a crude gas/air fuel cell system, 8:23783 (R;DE;In German)
Development of a lead tetrafluoroborate accumulator, 8:23670 (R;DE;In German)
Development of a methane measuring equipment for several measuring points, 8:23008 (R;DE;In German)
Development of a telemetry system for seismic application, 8:23012 (R;DE;In German)
Development of an optimizing method for the design of pipe systems in the ground used as heat source for heat pumps, 8:23855 (R;DE;In German)
Development of dry-filter dust extractors to reduce dust development during operation of heading machines, 8:24229 (R;DE;In German)
Development of noise-abatement aids in underground mining operations, 8:22970 (R;DE;In German)
Directionally solidified eutectic superalloys for stationary gas turbines, 8:23407 (R;DE;In German)
Electrodes and diaphragms for fuel cells, 8:23784 (R;DE;In German)
Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses, 8:23796 (R;DE;In German)
Energy conservation by gas-fulled heat pumps for hot water space heating systems, 8:23803 (R;DE;In German)
Fuel of MSW, 8:23217 (R;DE;In German)
Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23802 (R;DE;In German)
Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23854 (R;DE;In German)
Fundamental study on the feasibility of waste heat utilization in households, 8:23848 (R;DE;In German)
Further development of automatic measuring equipment for X-ray mineral analysis with computer, 8:24496 (R;DE;In German)
Geological and geotechnical studies for the construction of pilot caverns in rock for the storage of crude oil, hydrocarbon products and LPG, 8:23045 (R;DE;In German)
Heat energy consumption and intermittent heating, 8:23800 (R;DE;In German)
High temperature properties of Si_3N_4, 8:23994 (R;DE;In German)
High temperature water vapor electrolysis (HOT ELLY), 8:23203 (R;DE;In German)
Insulation of exterior walls, placement of radiators and room climate, 8:23798 (R;DE;In German)
Investigation of the economic possibilities regarding the reduction of energy intensity for electrical household appliances. Vol. 1, 8:23797 (R;DE;In German)
Investigation of the interaction between the power electronic circuit and power supply systems, 8:23431 (R;DE;In German)
Investigation of the use of coal-waste as raw-material for the production of aluminium, 8:22944 (R;DE;In German)
Investigation of water chemical effects resulting from the application of additivs in MSF-plants, 8:23847 (R;DE;In German)
Long time corrosion testing with and without mechanical stress of high temperature alloys for blades of land based gas turbines with high output, 8:23892 (R;DE;In German)
Measuring program for hot water supply in prefabricated houses using solar energy, 8:23313 (R;DE;In German)
Optimization of combination of coal hydrogenation, Fischer-Tropsch synthesis and gasification for the production of motor fuels, 8:22914 (R;DE;In German)
Parameters influencing noise emission during hot-saw and cold-saw operations and noise reduction measures, 8:24478 (R;DE;In German)
Pilot working for the prevention of rock bumps in seam Wilhelm/Johann in Colliery Sachsen, 8:22968 (R;DE;In German)
Potential of organic residues for the production of basic chemical compounds. Pt. 1, 8:23849 (R;DE;In German)
Potential of organic residues for the production of basic chemical compounds. Pt. 2, 8:23850 (R;DE;In German)
Potential of organic residues for the production of basic chemical compounds. Pt. 3, 8:23851 (R;DE;In German)
Potential of organic residues for the production of basic chemical compounds, 8:23852 (R;DE;In German)
Process for removing sulfur oxides from gases with direct production of a usable finished reaction product, 8:22943 (R;DE;In German)
Project study gas, tar and oil production by devolatilization of power station coal, 8:22913 (R;DE;In German)
Reducing the basic emission of methane by advance drainage, 8:22969 (R;DE;In German)
Registration of shear waves, 8:24486 (R;DE;In German)
Research on the fundamentals of process control in hard coal preparation, 8:22982 (R;DE;In German)
Solar energy model Goennebek, 8:23314 (R;DE;In German)
Study on an example of heat supply from waste heat, 8:23853 (R;DE;In German)
System study on the possibilities of intensified use of solar energy in the Federal Republic of Germany (FRG), 8:23312 (R;DE;In German)
Test stations for flat plate collectors for Iran, Brazil and India, 8:23259 (R;DE;In German)
Three-dimensional migration of travel time maps, 8:23049 (R;DE;In German)
Use of computers for the documentation of supply lines, 8:23430 (R;DE;In German)
Window and its heat balance considering solar radiation and additional insulation measures, 8:23799 (R;DE;In German)
Bureau of Health Facilities Financing, Compliance and Conversion, Hyattsville, MD (USA)
Cost containment in hospitals through energy conservation (case histories of energy conservation based on a national survey of selected hospitals), 8:23708 (R;US)
Bureau of Land Management, Anchorage, AK (USA). Alaska Outer Continental Shelf Office
Types of potential effects of offshore oil and gas development on marine mammals and endangered species of the northern Bering Sea and Arctic Ocean. Technical paper no. 9 (final), 8:24290 (R;US)
Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center
Relation of geology to mine roof conditions in the Pocahontas No. 3 coalbed. Information circular/1982, 8:22981 (R;US)
Bureau of Mines, Reno, NV (USA). Reno Research Center
In-place leaching of uranium, copper, and evaporites, 8:23101 (R;US)
Burns and Roe, Inc., Oradell, NJ (USA)
Assessment of European district-heating technology, 8:23702 (R;US)

C

Cabot Consulting Group, Washington, DC (USA)
Transportation energy contingency planning: transit fuel supplies under decontrol, 8:23715 (R;US)
California Energy Resources Conservation and Development Commission, Sacramento (USA). Conservation Div.
DOECTZDATA; California sixteen-zone weather data, 8:25223 (R;US)
California Inst. of Tech., Pasadena (USA)
Research in atmospheric chemistry and transport. Final report, 15 Sep 1978-14 Jan 1982, 8:24238 (R;US)
California Univ., Berkeley (USA). Coll. of Engineering
CORTES; thermal & mechanical analysis of tees, 8:24085 (R;US)
California Univ., Berkeley (USA). Operations Research Center
An incentive approach to eliciting probabilities. Research report, 8:24307 (R;US)
CAP Gemini, Inc., Vienna, VA (USA)
ADP requirements study report. Volume 1. ADP requirements statement, 8:25269 (R;US)
ADP Requirements Study Report. Volume II. Appendices A, B, C and D, 8:25288 (R;US)
ADP requirements study report. Volume III. Appendix E, 8:25287 (R;US)
ADP requirements study report. Volume IV. Analysis of alternative options: projected ADP requirements, 8:25270 (R;US)
ADP requirements study report. Volume V. Procurement specifications statement, 8:25271 (R;US)
Carnegie-Mellon Univ., Pittsburgh, PA (USA)
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R;US)
Color-center production and lattice expansion in KBr by x-irradiation near room temperature, 8:24076 (R;US)
Proceedings of the workshop on nuclear and particle physics at energies up to 31 GeV: new and future aspects, 8:24578 (R;US)
CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)
Kinetic aspects of the n-GaAs/(S/Se)sub(n)sup(2-) photoelectrochemical cell, 8:23262 (R;FR)
Solar biotechnology: microalgae production in tubular photoreactors for energy and chemicals, 8:23260 (R;FR)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)
Polarized electron source for parity experiment at Bates, 8:24176 (R;US)
Small angle neutron scattering study of structural heterogeneities in -Si:H, 8:23261 (R;FR)
Centre d'Etudes et de Recherches de la Compagnie Electro-Mecanique, 93 - Le Bourget (France)
Production of hydrogen by electrolysis of water under at medium temperature. Final report, 8:23205 (R;XE)
Centre Scientifique et Technique de la Construction, Brussels (Belgium)
Study of the effect that building insulation has on the actual fuel consumption. Final report, 8:23322 (R;XE;FR)
C-E Power Systems, Windsor, CT (USA)
Evaluation and demonstration of methods for improved fuel utilization: Fort Calhoun spent-fuel-pool cleanup following a spill of hydraulic fluid containing glycol, 8:23471 (R;US)
Evaluation and demonstration of methods for improved fuel utilization. Sixth semi-annual progress report, April 1, 1982-September 30, 1982, 8:23472 (R;US)
CER Corp., Las Vegas, NV (USA)
Approximation of continuity of lenticular Mesaverde Group sandstone lenses utilizing close-well correlations, Piceance Basin, NW Colorado. SPE 11610, 8:23059 (R;US)
Chicago Univ., IL (USA)
Energy security in the industrial nations, 8:23723 (R;US)
Resonances in s-d shell nuclei, 8:24651 (R;US)
Topics in finite time thermodynamics, 8:24158 (R;US)
Chinese Academy of Sciences, Peking. Inst. of Atomic Energy
Time-resolved measurements of hydrogen and deuterium fluxes in the ASDEX plasma boundary, 8:24775 (R;US)
City Coll., New York (USA)
Polarized electron source for parity experiment at Bates, 8:24176 (R;US)
Cleveland Public Schools, OH (USA). Dept. of Research and Analysis
Do-it-yourself home energy-saving techniques. 1981-82 annual technical progress report, September 25, 1981-June 30, 1982, 8:23815 (R;US)
Cliffs Minerals, Inc., Granville, WV (USA)
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R;US)
Analysis of the Devonian shales in the Appalachian Basin. Volume II. Appendices, 8:23058 (R;US)
Colorado Dept. of Natural Resources, Denver (USA)
Geothermal-resource assessment of Ranger Warm Spring, Colorado. Resources Series 24, 8:23369 (R;US)
Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22, 8:23368 (R;US)
Colorado School of Mines, Golden (USA). Research Inst.
Soil-depth requirements to reclaim surface-mined areas in the northern Great Plains. Open file report 29 Jul 76-8 Apr 82, 8:22965 (R;US)
Colorado State Univ., Fort Collins (USA). Fluid Dynamics and Diffusion Lab.
Wind-tunnel research of flowfields within naturally ventilated rooms of simple geometry, 8:23816 (R;US)
Colorado Univ., Boulder (USA). Dept. of Chemistry
Laser photoelectron spectroscopy of ions. Progress report, August 1, 1982-July 31, 1983, 8:24527 (R;US)
Columbia Univ., New York (USA). Plasma Physics Lab.
Superfast Z-pinch-produced plasmas, 8:24760 (R;US)
Columbia Univ., New York (USA). Radiological Research Lab.
Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R;US)
Combustion Engineering, Inc., Windsor, CT (USA)
Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report, 8:22931 (R;US)
Fluidized bed retrofit study of CE-VUX type boiler at the Jamestown Board of Public Utilities, Carlson Station, Jamestown, New York, 8:23424 (R;US)
Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Dipartimento Reattori Veloci
Thermomechanical analysis of a SPX 1 type sodium-air heat exchanger, 8:23515 (R;IT;IT)
Comitato Nazionale per l'Energia Nucleare, Rome (Italy)
Magnitude readings of the Lucano-Campano earthquakes of November 23, 1980 as recorded by accelerometers, 8:24487 (R;IT;IT)
Observation of several large earthquakes with an eastern epicenter. The macroseismic region in Italy of the 1903 Greek earthquake, 8:24488 (R;IT;IT)
Commission of the European Communities, Luxembourg
Abstracts of final reports of the first R and D programme on geothermal energy, 8:23361 (R;US)
Advanced electrochemical energy storage devices. Final report 1 Jan 78-31 Mar 80, 8:23681 (R;US)
Compact latent-heat thermal storage systems utilizing phase changes within the temperature range of 320 K and 340 K. Final report, 8:23358 (R;US;GE)
Conversion and chemical storage of solar energy in a photoelectrochemical cell. Final report, 8:23275 (R;US)
Determination du flux geothermique en France (Determination of the geothermal heat flow in France), 8:23371 (R;US)
Development and parametric testing of alkaline water electrolysis cells for hydrogen production based on inorganic-membrane-electroylet technology. Final report, 8:23206 (R;US)
Development of a thermal storage system based on the heat of absorption in hygroscopic materials. Final report, 8:23359 (R;US)
Development of an energy converter for the production of heat, mechanical and electrical energy through the gasificaton of wood and straw in a batch gasifier with an output of 50-150 kw. extended to include the gasification of batched biomass with an output of 150-400 kw. Final report, 8:23226 (R;US)
Effect of the electrical field in the membrane of photosynthesis. Final report, 8:24479 (R;US)
Energy from marine biomass: methane production by mariculture on land. Final report, 8:23272 (R;US)
Energy recovery by gasification of agricultural and forestry wastes in a co-current moving bed reactor. Final report, 8:23274 (R;US)

Estimates of the daily solar radiation on orientated and inclined receiver surfaces. Final report, 8:23247 (R;US;FR)
Gas generation of low b.t.u. fuel gas from agricultural residues. Final report, 8:23225 (R;US)
Geothermal heating, 8:23385 (R;US)
Heat recovery by organic Rankine cycle in ceramics firing ovens. Final report, 8:23865 (R;US)
Optimization of heat storage systems using silica gels. Final report, 8:23665 (R;US)
Photocatalytic production of hydrogen from water, using sunlight. Final report, 8:23207 (R;US)
Photochemical dissociation of water adsorbed in artificial membranes made from phyllosilicates. Final report, 8:23208 (R;US)
Photochemical, photoelectrochemical and photobiological conversion. Final report, 8:23273 (R;US)
Photosynthetic hydrogen evolution by chloroplasts and algae and on a chloroplast battery, 8:23209 (R;US)
Present state of technology of recovery and conversion process for synthetic fuels - volume II, 8:23223 (R;US)
Present state of technology of recovery and conversion process for synthetic fuels - Volume 1, 8:23224 (R;US)
Recherche d'une biotechnologie solaire basee sur la culture continue de cellules photosynthetiques (Research on a solar biotechnology based on the continuous culture in photosynthetic cells). Final report, 8:23276 (R;US)
Seismische studien zur bestimmung der krustenstruktur im bereich der geothermischen anomalie der toskana (seismic studies for defining the structure of the crust within the area of the geothermal anomaly of tuscany). Final report, 8:23374 (R;US)
The photochemical dissociation of water by means of visible light, 8:23210 (R;US)

Compagnie Generale d'Electricite (CGE), 91 - Marcoussis (France). Lab. de Marcoussis
Electrolyzer module which uses bipolar electrodes with very high catalytic activity. Final report, 8:23204 (R;XE;FR)

Computer Sciences Corp., Richland, WA (USA)
AXICRP; finite element code for creep analysis, 8:23513 (R;US)

Cornell Univ., Ithaca, NY (USA)
Transmission-line structure foundations for uplift-compression loading. Final report, 8:23437 (R;US)

Corps of Engineers, Tulsa, OK (USA)
Technical and economic feasibility of salt-gradient solar ponds at the Truscott Brine Lake of the Red River Chloride Control Project. A report to the House-Senate Committee on Appropriations of the Ninety-Seventh Congress, 8:23306 (R;US)

Corps of Engineers, Waltham, MA (USA). New England Div.
Hydropower study. Blackwater Dam, Webster, New Hampshire. Reconnaissance report, 8:23240 (R;US)

D

Dames and Moore, Los Angeles, CA (USA)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments, 8:23233 (R;US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments, 8:23235 (R;US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments, 8:23234 (R;US)

Dames and Moore, White Plains, NY (USA)
Influence of leach rate and other parameters on groundwater migration, 8:23184 (R;US)

Dartmouth Coll., Hanover, NH (USA). Thayer School of Engineering
Role of grain size on the brittle-to-ductile transition of the strongly ordered alloy Ni_3Al: report on progress during year-2, 8:23952 (R;US)

Day Energy Management, Plano, TX (USA)
Petroleum logistics. Final report and summary, 8:23725 (R;US)

Decision Focus, Inc., Palo Alto, CA (USA)
Commercialization analysis of large wind energy conversion systems. Final report, 8:23390 (R;US)

Department of Agriculture, Washington, DC (USA)
Microemulsions from vegetable oil and aqueous alcohol with 1-butanol surfactant as alternative fuel for diesel engines, 8:23239 (P;US)

Department of Atomic Energy, Bombay (India)
Proceedings of the workshop on nuclear techniques in hydrology, 8:24483 (R;IN)

Department of Energy, Argonne, IL (USA). New Brunswick Lab.
Progress report for the period October 1981-September 1982, 8:23194 (R;US)

Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center
In-situ combustion project at Bartlett, Kansas. Final report, 8:23016 (R;US)

Department of Energy, Grand Forks, ND (USA). Grand Forks Energy Technology Center
Review of low-rank-coal AFBC testing, 8:22996 (R;US)

Department of Energy, Laramie, WY (USA). Laramie Energy Technology Center
Depositional environments, subsurface stratigraphy, and post-burn characterization of the Paleocene-Eocene Hanna Formation at the Hanna, Wyoming underground coal-gasification site: Hanna II Phase 1 experiment, 8:22923 (R;US)

Department of Energy, Morgantown, WV (USA). Morgantown Energy Research Center
Bibliography of Upper Devonian-Shale sequence, 8:23074 (R;US)

Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center
Advanced pressurized fluidized-bed combustion, 8:24150 (R;US)
Unconventional gas resources, 8:23075 (R;US)

Department of Energy, Oak Ridge, TN (USA). Technical Information Center
Carbon dioxide and climate. A bibliography, 8:24233 (R;US)
Gas-cooled reactor technology: a bibliography, 8:23507 (R;US)
Information for technology innovation. Summary paper, 8:25284 (R;US)
Information protection and control, 8:25283 (R;US)
Nuclear reactors built, being built, or planned in the Unites States as of June 30, 1981, 8:23443 (R;US)
Selected measurement methods for plutonium and uranium in the nuclear fuel cycle, 8:23197 (R;US)
Solar Energy Update: a current awareness journal, 8:23246 (R;US)
Transborder flow of information. Summary paper, 8:25285 (R;US)

Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center
Coal liquefaction in SYNTHOIL reactor without added catalyst, 8:22916 (R;US)
Provisional values for the thermodynamic properties of potassium sulfide, 8:23776 (R;US)

Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R;US)
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R;US)
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R;US)
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R;US)
Dense-medium cycloning of fine coal at low specific gravities, 8:22987 (R;US)
Design and modeling of low-pressure-drop methanation reactors, 8:23218 (R;US)
Overview of coal liquefaction in the US Department of Energy, 8:22917 (R;US)
Pilot-plant study of an adiabatic parallel-plate methanation reactor, 8:23220 (R;US)
Proposal for research on heat transfer and hydrodynamics in preheaters for direct coal-liquefaction processes, 8:22928 (R;US)
Simultaneous removal of SO_2 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R;US)
Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R;US)
Transmission and backscatter Moessbauer spectroscopy of zeolite Fe (and Fe-Co) synfuel catalysts, 8:24057 (R;US)

Department of Energy, Pittsburgh, PA (USA). Pittsburgh Mining Technology Center
Coal preparation for synfuels: where do we stand, 8:22983 (R;US)
Department of Energy, Richland, WA (USA). Richland Operations Office
Spent-fuel-storage requirements: an update of DOE/RL-82-1, 8:23114 (R;US)
Department of Energy, Washington, DC (USA)
Application of HGMS in coal preparation, 8:22986 (R;US)
DOE's electron-beam-irradiation development program, 8:22954 (R;US)
Department of Energy, Washington, DC (USA). Energy Information Administration
EIA symposium on short-term energy forecasting. Summary of the proceedings, 8:23721 (R;US)
Monthly energy review, 8:23032 (R;US)
Department of Energy, Washington, DC (USA). Office of Inspector General
Administration of selected support-service contracts, 8:25226 (R;US)
Allegations of improper supplier practices affecting gasoline lines at independent stations, 8:23042 (R;US)
Alleged improprieties concerning the settlement of overcharge violations against the Tauber Oil Company, 8:23043 (R;US)
Costly delays in the purchase of a scientific computer for the Solar Energy Research Institute, 8:25227 (R;US)
Dissemination of technical information from the oil-shale program, 8:23079 (R;US)
Excessive costs incurred by the Strategic Petroleum Reserve program for rental and other services, 8:23722 (R;US)
Financial management in the oil-shale program, 8:23080 (R;US)
Five-megawatt geothermal-power pilot-plant project, 8:23375 (R;US)
Investigation of allegations of favored treatment of a relative of a senior official of the Department of Energy, 8:25230 (R;US)
Investigation of questions of possible document destruction by the Office of Special Counsel for Compliance, 8:25225 (R;US)
Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study, 8:23727 (R;US)
Management of furniture at Department of Energy headquarters locations, 8:25228 (R;US)
Management of the ten-megawatt solar-thermal central-receiver pilot-plant project, 8:23302 (R;US)
Performance accountability in the biomass energy systems program, 8:23254 (R;US)
Project management in the oil shale program, 8:23078 (R;US)
Public access to classified reports at the Los Alamos Scientific Laboratory, 8:25282 (R;US)
Receipt and use of half-fare airline coupons at selected Department of Energy field locations, 8:25229 (R;US)
Tokamak Fusion Test Reactor Project, 8:24828 (R;US)
Unrecovered costs of the headwater benefits program, 8:23742 (R;US)
Weatherization program in West Virginia, 8:23812 (R;US)
Department of Health and Human Services, Washington, DC (USA)
LTR-vectors, 8:24338 (P;US)
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.)
Thermodynamic model for a central receiver of a solar plant with partial shading of the heliostat field, 8:23300 (R;DE;In German)
Deutsche Gesellschaft fuer Qualitaetsforschung (Pflanzliche Nahrungsmittel) e.V., Geisenheim (Germany, F.R.)
17. Lecture meeting on municipal composts and food quality, 8:24405 (R;DE;GE)
Deutsche Presse-Agentur G.m.b.H., Hamburg (Germany, F.R.)
International Energy Agency and its growing task, 8:23714 (R;DE;In German)
DHR, Inc., Washington, DC (USA)
Foreign applications and export potential for wind-energy systems, 8:23761 (R;US)
Dillon, Read and Co., Inc., New York (USA)
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume V. Economic and financial analysis, 8:23231 (R;US)
Donohue, Anstey and Morrill, Boston, MA (USA)
Project to test for shale gas in Ohio. Final report, 8:23054 (R;US)
Dryermate Co., Xenia, OH (USA)
Residential dryer-exhaust energy-reclamation demonstration project. Final report, 8:23814 (R;US)
Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)
Behavior of ruthenium during reprocessing of spent reactor fuel, 8:23113 (TG;US)
Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.
Economics of spent LWR fuel storage, 8:23116 (R;US)
POLUTE; forest air pollutant uptake model, 8:24301 (R;US)
TRITMOD; advection model of tritium dispersion, 8:24261 (R;US)
Two-dimensional dynamical drainage-flow model with Monte Carlo transport and diffusion calculations, 8:24234 (R;US)
Duquesne Light Co., Shippingport, PA (USA)
Shippingport Atomic Power Station. Quarterly operating report, fourth quarter 1982, 8:23470 (R;US)

E

ECA, Inc., Woodridge, IL (USA)
Corrosion problems associated with solar fluid and components, 8:23315 (R;US)
EDS Nuclear, Inc., San Francisco, CA (USA)
CONTEMPT4/MOD2; multicompartment containment, 8:23584 (R;US)
EG and G Idaho, Inc., Idaho Falls (USA)
Common-cause fault rates for instrumentation and control assemblies, 8:23631 (R;US)
Conceptual design of the INTOR first-wall system, 8:24823 (R;US)
Decontamination and decommissioning of TAN radioactive liquid-waste-evaporator system (PM-2A). Final report, 8:23123 (R;US)
DN detection during SLSF tests, 8:23587 (R;US)
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R;US)
Introductory user's manual for the US Nuclear Regulatory Commission Reactor Safety Research Data Bank, 8:23628 (R;US)
Leach tests of simulated low-level transuranic waste forms containing transuranic elements, 8:23124 (R;US)
Massachusetts low-level radioactive-waste-management survey. National Low-Level Radioactive Waste Management Program, 8:23122 (R;US)
Raft river geothermal pump disassembly and inspection, 8:23381 (R;US)
SOERP; second-order error propagation code, 8:25234 (R;US)
Submerged demineralize system processing of TMI-2 accident waste water, 8:23616 (R;US)
SUPAN; analysis of beam-type piping supports, 8:23400 (R;US)
Ultrasonic-image reconstruction with surface mapping and synthetic-aperture techniques, 8:24141 (R;US)
Electricite de France, 75 - Paris
Progress report - operating accounts in 1981, 8:23743 (R;FR;In French)
Electric Power Research Inst., Palo Alto, CA (USA)
Advanced intake technology for cooling-water intakes: current status and future direction, 8:23409 (R;US)
R and D benefits assessment - a regional approach, 8:23746 (R;US)
Seminar proceedings: municipal solid waste as a utility fuel, 8:23877 (R;US)
Electric Power Research Inst., Palo Alto, CA (USA). Nuclear Power Div.
Joint TMI-2 information and examination program: EPRI participation and support, 1982 progress and 1983 program plan, 8:23615 (R;US)
Electric Power Research Inst., Palo Alto, CA (USA). Systems and Materials Dept.
Nondestructive evaluation program: progress in 1982, 8:23464 (R;US)
Plant Materials Program: progress June 1981-May 1982, 8:23465 (R;US)
Energie Studie Centrum, Petten (Netherlands)
Hydropower from Dutch rivers: a survey of potential and restrictions, 8:23241 (R;US;GE)

Energy Management Associates, Inc., Santa Clara, CA (USA)
Issues in implementing a load-management program for direct load control. Final report, 8:23744 (R;US)
Engelhard Minerals and Chemicals Corp., Edison, NJ (USA). Research and Development Dept.
Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978, 8:23790 (R;US)
Engineers International, Inc., Downers Grove, IL (USA)
Research on air sprays and unique foam-application methods. Phase II-B report: laboratory investigation of air sprays, 8:22980 (R;US)
Enviro Control, Inc., Rockville, MD (USA)
Industrial hygiene comprehensive survey, Cresap test facility, Cresap, West Virginia - a study of coal liquefaction processes. Final report, 8:23011 (R;US)
Industrial hygiene comprehensive survey. Solvent Refined coal pilot plant, Fort Lewis, Washington - a study of coal liquefaction processes. Final report, 8:24258 (R;US)
Environmental Protection Agency, Ann Arbor, MI (USA)
A brief summary of the technical feasibility, emissions, and fuel economy of pure methanol engines, 8:23237 (R;US)
Environmental Protection Agency, Montgomery, AL (USA). Eastern Environmental Radiation Facility
The Eastern Environmental Radiation Facility's participation in interlaboratory and intralaboratory comparisons of environmental sample analyses: 1979 and 1980. Final report, 8:24265 (R;US)
Environmental Research and Technology, Inc., Westlake Village, CA (USA)
Precipitation-scavenging chemistry for sulfate and nitrate from the SURE and related data. Volume 2. Final report, 8:24224 (R;US)
ERA Technology Ltd., Leatherhead (UK)
Electric Power Plant International, 8:23421 (R;US)
European Organization for Nuclear Research, Geneva (Switzerland)
High p/sub T/ π^0 production with $\alpha\alpha$ and αp beams at the CERN ISR, 8:24577 (R;US)
Exxon Nuclear Co., Inc., Richland, WA (USA)
Sphere-pac fuel development program. Semi-annual progress report, April 1982-September 1982, 8:23106 (R;US)
Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)
Mechanical-reliability evaluation of a proposed emergency-response radioiodine air sampler, 8:24249 (R;US)
Exxon Research and Engineering Co., Florham Park, NJ (USA)
EDS-coal-liquefaction process development. Phase IV. Construction of Exxon Coal-Liquefaction Pilot Plant. Final report, 8:22919 (R;US)

F

Factory Mutual Research Corp., Norwood, MA (USA)
Fire tests in ventilated rooms: detection of cable-tray and exposure fires, 8:23420 (R;US)
Federal Trade Commission, Washington, DC (USA)
Mergers in the petroleum industry: report of the Federal Trade Commission, 8:23036 (R;US)
Fermi National Accelerator Lab., Batavia, IL (USA)
Stochastic stacking without filters, 8:24194 (R;US)
Successes and failures of the constituent quark model, 8:24605 (R;US)
Filtrol Corp., Los Angeles, CA (USA)
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R;US)
Fish and Wildlife Service, Slidell, LA (USA). National Coastal Ecosystems Team
Proceedings of a workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of Outer Continental Shelf development, 8:23040 (R;US)
Fish and Wildlife Service, Washington, DC (USA). Office of Biological Services
Habitat suitability index models: regression models based on harvest of cool and coldwater fishes in reservoirs, 8:24398 (R;US)
Florida Solar Energy Center, Cape Canaveral (USA)
Analytical investigations of the relative solar rating concept. Final report. Report Number FSEC 80-6, 8:23319 (R;US)
Flow Industries, Inc., Kent, WA (USA)
Development of a quiet Stirling cycle multi-fuel engine for electric power generation. Final report Feb-Aug 82, 8:23397 (R;US)
FluiDyne Engineering Corp., Minneapolis, MN (USA)
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R;US)
Fluor Engineers and Constructors, Inc., Irvine, CA (USA)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate, 8:23228 (R;US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate, 8:23229 (R;US)
Fluor Engineers, Inc., Irvine, CA (USA)
Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report, 8:23416 (R;US)
Ford, Bacon and Davis Utah, Inc., Salt Lake City (USA)
Effects of moisture on radon emanation including the effects on diffusion. Open file report oct 79-Nov 81, 8:23097 (R;US)
Forest Service, Broomall, PA (USA). Northeastern Forest Experiment Station
Converting small industrial boilers to burn wood fuels. Forest Service research paper (final), 8:24153 (R;US)
Stream water quality in the coal region of Alabama and Georgia. General technical report (final), 8:22963 (R;US)
Stream water quality in the coal region of Pennsylvania. General technical report, 8:22962 (R;US)
Fort Belknap Community Council, Harlem, MT (USA)
Report to the Fort Belknap Community Council on the work undertaken during the summer, 1979, 8:23014 (R;US)
Foster Wheeler Corp., Livingston, NJ (USA). Nuclear Dept.
Foster Wheeler protected bayonet-tube steam-generator conceptual designs, 8:23518 (R;US)
Foster Wheeler Synfuels Corp., Livingston, NJ (USA)
Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center, 8:23085 (R;US)
Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Garmisch-Partenkirchen (Germany, F.R.). Inst. fuer Atmosphaerische Umweltforschung
Balance of the tropospheric ozone and its relation to stratospheric intrusions indicated by cosmogenic radionuclides. Technical progress report, November 1, 1979-June 30, 1980, 8:24232 (R;US)
Freiburg Univ. (Germany, F.R.). Forstwissenschaftliche Fakultaet
In vivo cytogenetic effect of some salts of the heavy metals cadmium, chromium, mercury, and platinum in assays of micronuclei and sister chromatid exchange, 8:24411 (R;DE;In German)
Fuel and Mineral Resources, Inc., Reston, VA (USA)
Annotated review of the technological state-of-the-art of ethyl and methyl alcohol-based fuels and determination of the economic feasibility of commercial-scale production of such fuels, 8:23238 (R;US)

G

GAI Consultants, Inc., Monroeville, PA (USA)
Transmission-line structure foundations for uplift-compression loading. Final report, 8:23437 (R;US)
GA Technologies, Inc., San Diego, CA (USA)
Computer control and data acquisition for neutral-beam injectors, 8:24829 (R;US)
Laser-fluorescence measurements of hydrogen and metal densities in the Doublet III tokamak, 8:24763 (R;US)
GCA Corp., Bedford, MA (USA). GCA Technology Div.
Simplified approaches to protecting PSD Class I areas. Final report, 8:24302 (R;US)

General Accounting Office, Washington, DC (USA). Energy and Minerals Div.
Improvements needed in the cash management practices of Interior's simultaneous oil and gas leasing program in Wyoming, 8:23724 (R;US)
General Atomic Co., San Diego, CA (USA)
HTGR applications program. Semiannual report for the period October 1, 1980-March 31, 1981, 8:23538 (R;US)
General Electric Co., Pittsfield, MA (USA). Power Transformer Dept.
Compact gas-insulated transformer. Thirteenth quarterly report, 8:23433 (R;US)
General Electric Co., San Jose, CA (USA)
BWR refill-reflood program - TRAC-BWR component development, 8:23609 (R;US)
General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.
Oxygen suppression in boiling-water reactors: Phase 2. Final report, 8:23447 (R;US)
General Electric Co., Schenectady, NY (USA). Electric Utility Systems Engineering Dept.
Assessment of distributed wind-power systems, 8:23392 (R;US)
Assessment of distributed wind-power systems. Final report, 8:23391 (R;US)
General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.
SYSREL; reliability analysis of series systems, 8:25257 (R;US)
General Electric Co., Sunnyvale, CA (USA). Advanced Reactor Systems Dept.
BEHAVE-SST; overpower transient fuel mechanics, 8:23512 (R;US)
General Energy Associates, Cherry Hill, NJ (USA)
Economic evaluation of competing industrial waste-heat-recovery technologies, 8:23856 (R;US)
General Physics Corp., Columbia, MD (USA)
Human-reliability data bank for nuclear power plant operations. Volume 1. A review of existing human-reliability data banks, 8:23630 (R;US)
General Research Corp., McLean, VA (USA)
Inventory of acid-deposition research projects funded by the private sector. Final report, 8:24237 (R;US)
GeoEnergy Corp., Las Vegas, NV (USA)
Correlation of surficial geologic anomalies with gas production, Cottageville Field, West Virginia, 8:23055 (R;US)
Geokinetics, Inc., Salt Lake City, UT (USA)
Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record, 8:23089 (R;US)
Geological Survey, Denver, CO (USA)
Two-dimensional, steady-state model of ground-water flow, Nevada Test Site and vicinity, Nevada-California, 8:24484 (R;US)
Geological Survey, Reston, VA (USA)
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R;US)
Eastern Gas Shales Project (EGSP) data files: a final report. Open-file report 81-598, 8:23051 (R;US)
Geologic map and coal resources of the Thompson Creek area, Big Horn County, Montana, 8:22966 (R;US)
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R;US)
Georgetown Univ., Washington, DC (USA). Law Center
Energy security in the industrial nations, 8:23723 (R;US)
Georgia Inter-Univ. Task Force (USA)
Guidebook for evaluation of resource recovery systems in municipalities, 8:23878 (R;US)
Georgia Power Co., Shenandoah (USA)
Solar Total-Energy Project, Shenandoah, Georgia site. Annual technical progress report, July 1, 1980-June 30, 1982, 8:23301 (R;US)
Georgia Univ., Athens (USA). Dept. of Chemistry
Fractionations of non-porphyrin complexes of vanadium and nickel from Boscan crude oil, 8:24047 (R;US)
Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)
Are there superheavy atomic nuclei, 8:24705 (R;DE;In German)
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Braunschweig (Germany, F.R.). Inst. fuer Tieflagerung
Summarized representation of the progress and results of the suitability test of the Konrad pit for final storage of radioactive wastes, 8:23125 (R;DE;In German)
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.)
Attempting a forecast on the future occurence of pollutants in food on the basis of today's and future production figures and patterns of application of chemicals, 8:24262 (R;DE;In German)
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.). Inst. fuer Radiohydrometrie
Radionuclide migration of the elements I, Sr, Cs and Ce in subsurface loose rocks, 8:24263 (R;DE;In German)
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.). Inst. fuer Strahlenschutz
Secondary electron spectra in the trace of fast ions travelling through water vapor, 8:24738 (R;DE;In German)
Giner, Inc., Waltham, MA (USA)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program, 8:23781 (R;US)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program, 8:23782 (R;US)
GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)
Chemisorptive discharge of hydrogen ions: An elementary step in hydrogen corrosion, 8:23954 (R;DE)
Glowny Inst. Gornictwa, Katowice (Poland)
Automation of the mud and water circulation process at coal-preparation plant - initial study, 8:22988 (R;PL)
Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries, 8:22977 (R;PL)
Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls, 8:22978 (R;US)
Modern underground mining technologies for pitching coalbed extraction. Report No. 2. Survey of geological and mining conditions of highly inclined and steep coalbeds, and technologies of working (mining systems) in European coalfields, 8:22976 (R;US)
Golder Associates, Inc., Bellevue, WA (USA)
Evaluation of alternative shaft-sinking techniques for high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 3), June 1981-July 1982, 8:23150 (R;US)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 2), June 1981-November 1982, 8:23153 (R;US)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Appendices. Final report (Task 2), June 1981-November 1982, 8:23154 (R;US)
Relationship of an in-situ test facility to a deep geologic repository for high-level nuclear waste. Final report (Task 4), June 1981-October 1982, 8:23151 (R;US)
Windfield and trajectory models for tornado-propelled objects. Final report, 8:23614 (R;US)
Gould, Inc., Rolling Meadows, IL (USA). Materials Lab.
Studies leading to the development of high-rate lithium-sulfuryl chloride battery technology. Quarterly report No. 3, 1 Apr-30 Jun 82, 8:23668 (R;US)
Government Industrial Research Lab., Osaka (Japan)
Electrode characterization of Li-Al/FeS cells, 8:23674 (R;US)
Grace (W.R.) and Co., Memphis, TN (USA). Agricultural Chemicals Group
Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant. Final report, 8:22922 (R;US)
Gruy Federal, Inc., Houston, TX (USA)
Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report, 8:23056 (R;US)

H

Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.)
Surface segregation in concentrated Ni-Cu alloys under irradiation, 8:23943 (R;US)
Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.). Bereich Kern- und Strahlenphysik
Scientific progress report 1981, 8:24642 (R;DE;In German and English)
Hamel, Park, McCabe and Saunders, Washington, DC (USA)
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis, 8:23232 (R;US)
Hanford Engineering Development Lab., Richland, WA (USA)
Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5, 8:23617 (R;US)
CACECO; LMFBR containment accident analysis, 8:23511 (R;US)
Effect of high solvent radiation exposures on TBP processing of spent LMFBR fuels, 8:23519 (R;US)
HAUSER5; nuclear reaction cross sections, 8:24640 (R;US)
Microstructural and microchemical comparisons of AISI 316 irradiated in HFIR and EBR-II, 8:23955 (R;US)
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R;US)
Preliminary assessment of interactions between the FMIT deuteron beam and liquid-lithium target, 8:24831 (R;US)
Role of radiation-damage analysis in the fusion program, 8:24830 (R;US)
Hannover Univ. (Germany, F.R.). Fakultaet fuer Maschinenwesen
Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage, 8:23439 (R;DE;In German)
Harvard Univ., Cambridge, MA (USA)
Polarized electron source for parity experiment at Bates, 8:24176 (R;US)
Harvard Univ., Cambridge, MA (USA). Biological Labs.
Studies of membrane structure by freeze-etching. Final report, January 1, 1979-December 31, 1982, 8:24325 (R;US)
Harvard Univ., Cambridge, MA (USA). Energy and Environmental Policy Center
Analysis of health effects resulting from population exposures to ambient particulate matter. Annual progress report, July 16, 1982-March 15, 1983, 8:24407 (R;US)
Analysis of health effects resulting from population exposures to ambient particulate matter. Appendices to the annual progress report, July 16, 1982-March 15, 1983, 8:24409 (R;US)
Hittman Associates, Inc., Columbia, MD (USA)
Analysis of commercial energy-conservation data. Final report, 8:23813 (R;US)
Holmes and Narver, Inc., Las Vegas, NV (USA)
SKILLS INVENTORY; personnel information system, 8:25224 (R;US)
Honeywell, Inc., Minneapolis, MN (USA). Systems and Research Center
Solar Pilot Plant Phase I, detailed design report: thermal storage subsystem research experiment. CDRL Item No. 8 (Approved), 8:23303 (R;US)
Hudson Associates, Santa Barbara, CA (USA)
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R;US)

I

IAP Research, Inc., Dayton, OH (USA)
Repetitive switching for inductive energy storage. Final technical report Apr 81-Jun 82, 8:23661 (R;US)
ICF, Inc., Washington, DC (USA)
Analysis of financial assumptions in selected Energy Information Administration models, 8:23711 (R;US)
Oil and natural gas extraction: a game theoretic approach, 8:23031 (R;US)
Idaho National Engineering Lab., Idaho Falls (USA)
Development of an improved-contact liquid-level probe for pressurized reactor vessels, 8:23495 (R;US)
EPICOR-II resin/linear research plan, 8:23608 (R;US)
Interim report on the TMI-2 purification filter examination, 8:23496 (R;US)
TMI-2 core-examination program: INEL facilities readiness study, 8:23607 (R;US)
IEA Coal Research, London (UK). Technical Information Service
Hydropyrolysis of coal, 8:22935 (R;GB)
Illinois Univ., Chicago (USA)
Fermi-surface properties of $CeSn_3$ and related compounds, 8:23947 (R;US)
Role of the breeder in long-term energy economics, 8:23701 (R;US)
Illinois Univ., Chicago (USA). Dept. of Energy Engineering
Electrostatically augmented gas-cleanup devices for particular removal, 8:22947 (R;US)
Illinois Univ., Urbana (USA)
Electrohydrodynamic pumping in cable pipes. Final report, 8:23435 (R;US)
Improved method for predicting seasonal and annual shadowing from cooling-tower plumes, 8:24401 (R;US)
Raman measurements of folded interlayer shearing phonons in KC_{12}/sub n/ (n = 2 approx. 6), 8:24032 (R;US)
Illinois Univ., Urbana (USA). Dept. of Ceramic Engineering
Densification of monoclinic ZrO_2 with vanadate additives. Final report 1 Mar 79-1 Mar 82, 8:23991 (R;US)
Illinois Univ., Urbana (USA). Dept. of Mechanical and Industrial Engineering
Common problems in modeling of thermal plumes in air and water, 8:24252 (R;US)
Illinois Univ., Urbana (USA). Energy Research Group
Marginal energy cost of goods and services. Final report, 8:23037 (R;US)
Illinois Univ., Urbana (USA). Materials Research Lab.
Influence of detector geometry on AEM-based x-ray microanalysis. I. Theoretical, 8:24046 (R;US)
Imperial Chemical Industries Ltd., Billingham (UK)
General framework for the assessment of dynamic resilience. Part II. An application, 8:23860 (R;US)
Infocom, Crawley (UK)
Foreign technology alert bibliography: batteries and components. Final report Jun 80-May 82, 8:23680 (R;US)
Informationszentrale der Elektrizitaetswirtschaft e.V. (IZE), Bonn (Germany, F.R.)
Energy conservation, 8:23709 (R;DE;In German)
Ingersoll-Rand Research, Inc., Princeton, NJ (USA)
Coal-feeder development. First quarterly technical progress report, October-December 1980, 8:22924 (R;US)
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R;US)
Duty-cycle investigations of continuous miners. Volume II. Instrument manual, 8:22975 (R;US)
Institute of Gas Technology, Chicago, IL (USA)
Multi-fuel low-NO/sub x/ burner development, Phase II. Final report Mar 79-Feb 82, 8:24152 (R;US)
Institut National de Recherches Agronomiques (INRA), 75 - Paris (France)
Production of cereal straw and corn stalks for energy purposes. Photosynthetic production of organic matter, 8:23271 (R;XE;FR)
Instituto Mexicano de Investigaciones Siderurgicas, Saltillo
Current coal preparation research in the United States, 8:22989 (R;MX)
Optimum conditions (technical and economic) for steel industry coke, 8:22932 (R;MX;In Spanish)
Recent developments in blast furnace coke production, 8:22933 (R;MX)
The effect of oxidation on the microhardness and plastic properties of Guasare coal, 8:22942 (R;MX;In Spanish)
Upgrading of waste material from coal washeries, 8:22956 (R;MX;In Spanish)
World developments in coal liquefaction processes and how these developments could affect South American coal owning nations, 8:22934 (R;MX)
World trends in coal preparation, 8:22990 (R;MX)
Intermountain Technologies, Inc., Idaho Falls, ID (USA)
Organization and structure of an EPRI DATATRAN data bank, 8:23613 (R;US)

International Bank for Reconstruction and Development, Washington, DC (USA)
Investment analysis in electricity supply. Staff working paper, 8:23422 (R;US)
International Business Machines Corp., Gaithersburg, MD (USA)
Solar-energy-system performance evaluation: Alpha Construction Co. single-family residence, Canton, Ohio, October 1978-March 1979, 8:23333 (R;US)
Solar-energy-system performance evaluation: J. D. Evans, Inc., House B, Columbia, Maryland, November 1978-March 1979, 8:23331 (R;US)
Solar-energy-system performance evaluation: Living Systems single-family residence, Davis, California, October 1978-March 1979, 8:23336 (R;US)
Solar-energy-system performance evaluation: Montecito Pines apartment complex, Santa Rosa, California, November 1978-March 1979, 8:23335 (R;US)
Solar-energy-system performance evaluation: Ortiz and Reill Developers, Inc., Lot 8 single-family residence, Escondido, California, October 1978-March 1979, 8:23338 (R;US)
Solar-energy-system performance evaluation: Washington Natural Gas Company, Kirkland, Washington, January 1979-March 1979, 8:23330 (R;US)
International Business Machines Corp., Huntsville, AL (USA)
Environmental data for sites in the National Solar Data Network, 8:23249 (R;US)
Environmental data for sites in the National Solar Data Network, 8:23250 (R;US)
Solar-energy-system performance evaluation. Concord Light Plant municipal garage and office building, Concord, Massachusetts, November 1978-March 1979, 8:23348 (R;US)
Solar-energy-system performance evaluation. Reedy Creek Utility District office building, Lake Buena Vista, Florida, September 1978-February, 1979, 8:23343 (R;US)
Solar-energy-system performance evaluation: Blakedale Professional Center Office Suite, Greenwood, South Carolina, October 1978-March 1979, 8:23342 (R;US)
Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979, 8:23337 (R;US)
Solar-energy-system performance evaluation: Hullco Construction Company single-family residence, Prescott, Arizona, May 1978-April 1979, 8:23334 (R;US)
Solar-energy-system performance evaluation: Irvine School (El Camino Real Elementary School) Irvine, California, October 1978-March 1979, 8:23344 (R;US)
Solar-energy-system performance evaluation: Northview Elementary School (Howard's Grove) Howard's Grove, Wisconsin, September 1978-April 1979, 8:23346 (R;US)
Solar-energy-system performance evaluation: Page Jackson Elementary School, Charles Town, West Virginia, November 1978-March 1979, 8:23345 (R;US)
Solar-energy-system performance evaluation: Rademaker Corporation office and warehouse building, Louisville, Kentucky, October 1978-March 1979, 8:23340 (R;US)
Solar-energy-system performance evaluation: Scattergood School Recreation Center, West Branch, Iowa, June 1978-April 1979, 8:23339 (R;US)
Solar-energy-system performance evaluation: Terrell D. Moseley office building, Lynchburg, Virginia, October 1978-March 1979, 8:23341 (R;US)
Solar-energy-system-performance evaluation: Perl-Mack Enterprises, Inc., single-family residence, Denver, Colorado, April 1978-March 1979, 8:23332 (R;US)
Thermal performance of space-cooling solar-energy systems in the National Solar Data Network, 8:23328 (R;US)
Thermal-performance analysis of space-heating systems in the National Solar Data Network, 8:23329 (R;US)
International Business Machines Corp., Huntsville, AL (USA). Federal Systems Div.
Environmental data for sites in the National Solar Data Network, 8:23248 (R;US)
Environmental data for sites in the National Solar Data Network, 8:23251 (R;US)
International Centre for Theoretical Physics, Trieste (Italy)
Dirac's large number hypothesis and the red shifts of distant galaxies, 8:24506 (R;XA)
Do neutron stars disprove multiplicative creation in Dirac's large number hypothesis, 8:24505 (R;XA)
Penrose process of energy extraction in electrodyamics, 8:24504 (R;XA)
International Inst. for Applied Systems Analysis, Laxenburg (Austria)
The growth of energy consumption and prices in the USA, FRG, France, and the UK, 1950-1980. Final report, 8:23757 (R;US)
Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Physics
On-line laser spectroscopy with a cooled He-jet transport system, 8:24174 (R;US)
Israel Electric Corp. Ltd., Haifa
Halo-thermal simulation of the Dead Sea, 8:24503 (R;IL)
Istituto Nazionale di Fisica Nucleare, Legnaro (Italy). Lab. Nazionale di Legnaro
New vacuum systems for the 7 MEV CN accelerator of the Legnaro National Laboratory, 8:24145 (R;IT;IT)
Istituto Nazionale di Fisica Nucleare, Milan (Italy)
Comparison between LYRA and SAND code performance for the extrapolation of data from activation detectors used for determining spectra of acceleration neutrons, 8:24203 (R;IT)

J

Jackson (Jerry) and Associates, Marietta, GA (USA)
Development and application of the NPPC commercial-energy-demand model, 8:23694 (R;US)
Japan Atomic Energy Research Inst., Tokai, Ibaraki. Japanese Nuclear Data Committee
Prediction of mass excess, β-decay energy and neutron separation energy from the atomic mass formula with empirical shell terms, 8:24643 (R;JP)
JAYCOR, San Diego, CA (USA)
Thermal-hydraulic code qualification: ATHOS2 and data from Bugey 4 and Tricastin 1. Final report, 8:23499 (R;US)
Jet Propulsion Lab., Pasadena, CA (USA)
Antimisting kerosene atomization and flammability. Interim report, 8:23046 (R;US)
Frictional characteristics and heat transfer of antimisting fuels in tubes. Final report Aug 80-Sep 81, 8:23044 (R;US)
Geothermal probabilistic cost study, 8:23376 (R;US)
Johns Hopkins Univ., Baltimore, MD (USA). Dept. of Biology
Mechanisms of mutagenesis: analysis through the use of alcohol dehydrogenase in Drosophila. Contract summary, May 1978-October 1980, 8:24408 (R;US)
Johns Hopkins Univ., Baltimore, MD (USA). Dept. of Physics
Spectra of germanium and selenium in the 50-350 A region from the PLT tokamak plasma, 8:24770 (R;US)
Johns Hopkins Univ., Baltimore, MD (USA). School of Medicine
The radiographic examination of the colon, 8:24344 (R;US)
Johns Hopkins Univ., Shady Side, MD (USA). Chesapeake Bay Inst.
Biogeochemistry of trace metals in Chesapeake Bay. Final report, April 1, 1981-March 31, 1982, 8:24278 (R;US)
Johnson Controls, Inc., Milwaukee, WI (USA). Globe Battery Div.
Development of unique lightweight high-performance lead-acid batteries, 8:23673 (R;US)
Joint Publications Research Service, Washington, DC (USA)
Effect of radioprotective agents on reactivity to space flight factors, 8:24343 (R;US)
JRB Associates, Inc., McLean, VA (USA)
Operation TUMBLER-SNAPPER 1952. Technical report, 8:24361 (R;US)
Potential human study populations for non-ionizing (radio frequency) radiation health effects, 8:24480 (R;US)

K

Kalamazoo Coll., MI (USA). Dept. of Physics
Spectroscopic properties of the f-elements in compounds and solutions, 8:24078 (R;US)
Kansas State Univ., Manhattan (USA)
Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels.

Progress report, February 16, 1982-February 15, 1983, 8:24082 (R;US)
Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Bio- und Geowissenschaften
Investigations on the biological behaviour and the decorporation of ^{234}Th in the rat, 8:24370 (R;DE;In German)
Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Chemie
Investigations on the improvement of activated alumina adsorbents, 8:24060 (R;DE;In German)
Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Maschinenbau
Experimental investigation of the unsteady one-phase flow through perforated plates, 8:23620 (R;DE;In German)
Katholieke Univ. Nijmegen (Netherlands)
Phase transitions in high magnetic fields, 8:23888 (R;US)
Kent Associates, Lake Oswego, OR (USA)
City of North Bonneville, Washington: Geothermal Exploration Project, production test well, Phase II. Final report, 8:23380 (R;US)
Kentucky Natural Resources and Environmental Protection Cabinet, Frankfort (USA)
Comprehensive low-level waste management plan for the state of Kentucky. Fifth quarterly report for the period ending December 31, 1982, 8:23121 (R;US)
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung
Installation of a positron annihilation apparatus for the investigation of Fermi surfaces, 8:24725 (R;DE;In German)
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung
Improved program for the determination of neutron efficiency of large Self Powered Neutron Detectors taking into account charge carrier production in the insulator, 8:24204 (R;DE;In German)
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Programmgruppe Systemforschung und Technologische Entwicklung
Energy technology data handbook. Vol. 1, 8:23423 (R;DE)
Low-temperature heat supply with special consideration to a variety of new technologies, 8:23817 (R;DE;In German)
Plastic solar air heaters of a novel design, 8:23352 (R;DE)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)
Nuclear safety project, 8:23618 (R;DE;In German)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Angewandte Kernphysik 2
Calculating matrix elements of slater determinant wave functions in the cluster model. Pt. 2, 8:24715 (R;DE)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Genetik und Toxikologie von Spaltstoffen
Investigations on the biological behaviour and the decorporation of ^{234}Th in the rat, 8:24370 (R;DE;In German)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik
Experimental investigation of the unsteady one-phase flow through perforated plates, 8:23620 (R;DE;In German)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Radiochemie
Analytical applications of neutron capture gamma-ray spectroscopy, 8:24049 (R;DE)
Investigations on the improvement of activated alumina adsorbents, 8:24060 (R;DE;In German)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorbauelemente
Thermal and mechanical behaviour of PWR fuel rod simulators for LOCA-experiments, 8:23619 (R;DE)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Nukleare Sicherheit
Thermal and mechanical behaviour of PWR fuel rod simulators for LOCA-experiments, 8:23619 (R;DE)
Knolls Atomic Power Lab., Schenectady, NY (USA)
CONDYN; Polya model secondary electron spectra, 8:24510 (R;US)
KVB, Inc., Irvine, CA (USA)
Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R;US)
Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.
Release of fission products from irradiated aluminide fuel at high temperature, 8:23604 (R;US)

L

Lane and Edson, P.C., Washington, DC (USA)
Innovative financing for energy-efficiency improvements. Phase II report: model documents and financial projections, 8:23705 (R;US)
Lawrence Berkeley Lab., CA (USA)
ABCRR;ABCRRJ; A+BC classical trajectory study, 8:24512 (R;US)
Computer control of electrochemical experiments with application to zinc/nickel oxide cells, 8:23679 (R;US)
Detectors, sampling, shielding, and electronics for positron emission tomography, 8:24342 (R;US)
Development of ferritic weldments for grain-refined ferritic steels for 4.2K service, 8:23971 (R;US)
DOE2.1A; building energy consumption analysis, 8:23794 (R;US)
Electrode characterization of Li-Al/FeS cells, 8:23674 (R;US)
Lighting-electromagnetic compatibility conference: proceedings, 8:23819 (R;US)
Moessbauer spectrometry study of Fe-Ni-X alloys, 8:23970 (R;US)
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R;US)
Residential demand for energy: a time-series and cross-sectional analysis for eight OECD countries, 8:23818 (R;US)
SOFTWARE TOOLS; program development interface, 8:25258 (R;US)
Spin waves at surfaces and steps in ferromagnets and antiferromagnets, 8:24741 (R;US)
Studies of molecular adsorbates at interfaces by optical second-harmonic generation, 8:24069 (R;US)
Lawrence Livermore National Lab., CA (USA)
Analysis of ambient vibrational motion of MFTF-A vessel/magnet structure, 8:24839 (R;US)
Analytical and experimental evaluation of a proposed self-forging fragment munition, 8:24216 (R;US)
BAGI: a technique for the detection and tracking of large gas clouds, 8:23070 (R;US)
BASIC2 INTERPRETER; minimal basic language, 8:25243 (R;US)
Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets, 8:24546 (R;US)
CLAP; linear control system design analysis, 8:24100 (R;US)
Comparative behavior of plutonium and americium in the equatorial Pacific, 8:24295 (R;US)
Denser-than-air dispersion modeling in the atmosphere, 8:23071 (R;US)
Design and testing of the TX-4 Type A container for packaging radioactive waste, 8:24114 (R;US)
Effect of a two-dimensional obstacle on the dispersion of a heavier-than-air gas in an atmospheric boundary layer, 8:24243 (R;US)
Effects of copper speciation on aquatic ecosystems, 8:23429 (R;US)
Energy and technology review, 8:24842 (R;US)
Environment and safety: major goals for MARS, 8:24846 (R;US)
First quarterly report of the DARPA dynamic synthesis and consolidation program, 8:24008 (R;US)
Fission-suppressed hybrid reactor: the fusion breeder, 8:24838 (R;US)
Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets, 8:24840 (R;US)
Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets, 8:24841 (R;US)
HEMP; hydrodynamic elasticmagneto plastic flow, 8:24567 (R;US)
High-energy propellant studies: introduction and overview, 8:24215 (R;US)
Human-factors engineering control-room design review/audit report: Byron Generating Station, Commonwealth Edison Company, 8:23567 (R;US)
Human-factors engineering control-room design review/audit: Waterford 3 SES Generating Station, Louisiana Power and Light Company, 8:23568 (R;US)
Implementing affirmative action in conservative times, 8:25232 (R;US)
IMPORTANCE; FTA basic event & cut set ranking, 8:25240 (R;US)
Large-scale hazardous gas release experiments, 8:23069 (R;US)

Laser isotope separation in nuclear-waste by-product utilization, 8:23176 (R;US)
LR; LR(1) grammar analyzer & parser generator, 8:25249 (R;US)
Material properties for TR-55 and silicone elastomeric cushions, 8:24033 (R;US)
NIKE2D: a vectorized, implicit, finite-deformation, finite-element code for analyzing the static and dynamic response of 2-D solids, 8:24143 (R;US)
Nuclear criticality safety experiments, calculations, and analyses: 1958 to 1982. Volume 1. Lookup tables, 8:23544 (R;US)
Nuclear criticality safety experiments, calculations, and analyses - 1958 to 1982. Volume 2. Summaries. Complilation of papers from the Transactions of the American Nuclear Society, 8:23545 (R;US)
Occurrence of biomarkers in Green River shale oil, 8:23086 (R;US)
Particle size for greatest penetration of HEPA filters - and their true efficiency, 8:24244 (R;US)
Physics of laser fusion. Volume IV. The future development of high-power solid-state laser systems, 8:24844 (R;US)
Preliminary investigation of interconnected systems interactions for the safety injection system of Indian Point-3, 8:23638 (R;US)
Quasi-optical ECRH beam system for MFTF-B, 8:24776 (R;US)
QUIKIE: a plotting routine to produce quick and easy graphs. Reference manual, 8:25279 (R;US)
Recent performance improvements on FXR, 8:24189 (R;US)
Shaped-charge penetration in concrete: a unified approach, 8:24218 (R;US)
SLAB: a time-dependent computer model for the dispersion of heavy gases released in the atmosphere, 8:23068 (R;US)
SLIC; interactive graphics 3-d mesh generation, 8:25259 (R;US)
Study of premature explosions in artillery projectiles filled with Composition-B. Final report, 8:24217 (R;US)
Tables of cross references among SECY 82-111, NUREG 0700, NUREG 0835, NUREG 0801, 8:23569 (R;US)
Technical evaluation report on the adequacy of station electric-distribution-system voltages for the Millstone Nuclear Power Station, Units 1 and 2. Docket Nos. 50-245, 50-336, 8:23467 (R;US)
Technical issues related to NUREG 0800, Chapter 18: Human Factors Engineering/Standard Review Plan, 8:23531 (R;US)
TMX upgrade magnet system mechanical issues, 8:24845 (R;US)
Yield determination using long-wavelength black-body radiation from an underground nuclear explosion, 8:24220 (R;US)
ZONE; 2-dimensional finite element mesh generator, 8:25235 (R;US)

Lee-Norse Co., Belle Vernon, PA (USA)
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R;US)
Duty-cycle investigations of continuous miners. Volume II. Instrument manual, 8:22975 (R;US)

Levy (S.), Inc., Campbell, CA (USA)
NATBWR: a steady-state model for natural circulation in boiling-water reactors, 8:23612 (R;US)

Library of Congress, Washington, DC (USA). Economics Div.
Natural gas revenues of major energy companies, 1977-1981, 8:23064 (R;US)

Little (Arthur D.), Inc., Cambridge, MA (USA)
Roofing asphalts, pitch and UVL carcinogenesis, 8:24453 (R;US)
Steel-mill-residue recycling processes: an energy and economic analysis. Project final report, 8:23857 (R;US)

Los Alamos National Lab., NM (USA)
Active neutron coincidence counting for the assay of MTR fuel elements, 8:23193 (R;US)
Analysis and thermal-design improvements of downhole tools for use in hot-dry wells, 8:23372 (R;US)
BICYCLE; levelized life cycle cost calculation, 8:23404 (R;US)
Buckling investigation of ring-stiffened cylindrical shells with reinforced openings under unsymmetrical axial loads, 8:23551 (R;US)
Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences, 8:24491 (R;US)
COMPARE/MOD1A; transient flow with sinks & doors, 8:23468 (R;US)
Computer model of chemistry and dynamics of the mesosphere, thermosphere, and ionosphere, 8:24508 (R;US)
Deflagration-to-detonation transition in PETN and HMX, 8:24211 (R;US)
Detailed petrographic descriptions and microprobe data for drill holes USW-G2 and UE25b-1H, Yucca Mountain, Nevada, 8:24485 (R;US)
Earthquake catalog for northern New Mexico. Progress report, January-March 1982, 8:24489 (R;US)
Flight-systems safety program, September 1982. Progress report, 8:23202 (R;US)
GNASH; particle induced cross-sections & spectra, 8:24671 (R;US)
Guide to MAPPER presentation graphics, 8:25275 (R;US)
INGEN; finite element program mesh generator, 8:25261 (R;US)
Initiation of propagating detonations, 8:24212 (R;US)
Los Alamos Controlled Air Incinerator for radioactive waste. Volume I. Rationale, process, equipment, performance, and recommendations, 8:23147 (R;US)
Los Alamos Meson Physics Facility high-resolution-spectrometer dipole magnets: a summary report, 8:24184 (R;US)
Modeling international steam-coal trade, 8:23007 (R;US)
MOL1D; partial differential equations solution, 8:25253 (R;US)
Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants, 8:24726 (R;US)
Proceedings of the workshop on LAMPF II synchrotron, 8:24183 (R;US)
Proceedings of the workshop on muon science and facilities at Los Alamos, 8:24545 (R;US)
Proceedings of the workshop on nuclear and particle physics at energies up to 31 GeV: new and future aspects, 8:24578 (R;US)
Production and characterization of beta-silicon carbide and alpha-silicon nitride whiskers for ceramic matrix composites, 8:24005 (R;US)
REFLUX; LWR reflood heat transfer prediction, 8:23445 (R;US)
SESAME '83: report on the Los Alamos Equation-of-State Library, 8:23969 (R;US)
SLATEC1.0; mathematical subroutine library, 8:25248 (R;US)
Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R;US)
Some nonlinear estimates for lateral propagation of self-generated B fields, 8:24764 (R;US)
Spectroscopic properties of the f-elements in compounds and solutions, 8:24078 (R;US)
STEEP4; thermonuclear reaction rates, 8:24758 (R;US)
Textural analysis of tephra from a rhyodacitic eruption sequence, Thira (Santorini), Greece, 8:24490 (R;US)
TRAC-PD2/MOD1; best-estimate analysis PWR LOCA, 8:23585 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23098 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R;US)
Use of the radio-frequency quadrupole structure as a cyclotron axial-buncher system, 8:24168 (R;US)
Vehicle monitors for domestic perimeter safeguards, 8:23192 (R;US)

Louisiana State Univ., Baton Rouge (USA). Nuclear Science Center
DEMONR; unbiased Monte Carlo slab shield code, 8:24716 (R;US)

Louisiana Universities Marine Consortium, Chauvin (USA)
Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, 8:24267 (R;US)

Louisville Univ., KY (USA). Dept. of Biology
Oil persistence in tundra and its impact on the below-ground ecosystem. Final report, 8:23039 (R;US)

Lowell Univ., MA (USA)
Development of retrofitting modifications of textile-loom picking and lay mechanisms for reduction of energy consumption. Final report, 8:23859 (R;US)

M

Martin Marietta Labs., Baltimore, MD (USA)
Studies of photosystem II using artificial donors. Progress report and renewal proposal. MML Proposal No. BI82-414, 8:24340 (R;US)

Maryland Univ., College Park (USA)
Effects of resonances in molecular photoionization measured with triply differential photoelectron spectroscopy, 8:24519 (R;US)
Maryland Univ., College Park (USA). Inst. for Physical Science and Technology
Photoelectron spectrometer for high-resolution angular resolved studies, 8:24209 (R;US)
Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)
TATB interlaboratory sieving study, 8:24213 (R;US)
Velocity perturbation of a flyer approaching a rigid impermeable barrier and the transmitted pressure pulse, 8:24214 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA)
In-plant considerations for optimal offsite response to reactor accidents, 8:23574 (R;US)
Micromechanical modeling of microstructural damage in creeping alloys. Progress report, March 1, 1982-February 28, 1983, 8:23950 (R;US)
Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, September 15, 1981-November 29, 1982, 8:23264 (R;US)
Polarized electron source for parity experiment at Bates, 8:24176 (R;US)
Utility Spot-Pricing Study: Wisconsin, 8:23748 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Center for Materials Science and Engineering
SCF-X alpha-SW cluster molecular-orbital models of catalysts, alloys, magnetic materials, and superconductors. Interim report, 8:23891 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Earth and Planetary Sciences
Microcracks and energy. Progress report, 1 March 1982-28 February 1983, 8:23096 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Materials Science and Engineering
Analysis of diffraction from [001] twist boundaries in cubic metals, 8:23951 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering
TDIST2; community energy consumption analysis, 8:23872 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Francis Bitter National Magnet Lab.
Magnetite recovery in coal washing by high-gradient magnetic separation. Quarterly project status report, 13th quarter, 8:22985 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Lab. for Nuclear Science
Production mechanisms of high mass muon pairs. Technical report number 117, 8:24576 (R;US)
Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.
Advanced flywheel-storage system, 8:23662 (R;US)
High-power I-V curve tracer employing a capacitive load, 8:23265 (R;US)
Seismic discrimination. Semiannual technical sumMary report no. 36, 1 Oct 81-31 mar 82, 8:24222 (R;US)
Westinghouse final report: design and fabrication of a prototype system for photovoltaic residences in the Southwest, 8:23291 (R;US)
McDonnell Aircraft Co., St. Louis, MO (USA)
McDonnell 40-kW Giromill wind system: Phase I. Design and analysis. Volume I. Executive summary, 8:23395 (R;US)
McDonnell Douglas Astronautics Co., Huntington Beach, CA (USA)
10-MWe solar-thermal central-receiver pilot plant: receiver cold-flow (Test 1010) and receiver steam-generation (Test 1030) test report, 8:23305 (R;US)
McDonnell Douglas Astronautics Co., St. Louis, MO (USA)
Conceptual design of the INTOR first-wall system, 8:24823 (R;US)
McDonnell Douglas Electronics Co., St. Charles, MO (USA)
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R;US)
Merix Corp., Wellesley, MA (USA)
Potential for cogeneration in distillation. Final report, 8:23863 (R;US)
Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (Germany, F.R.)
Heliostat field layout for solar thermal power plants, 8:23304 (R;US)
Michigan Univ., Ann Arbor (USA)
Area program in population genetics. Final report, November 1, 1975-August 31, 1982, 8:24366 (R;US)
Minnesota Univ., Minneapolis (USA)
Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982, 8:24522 (R;US)
Minnesota Univ., Minneapolis (USA). Dept. of Physics
On-line laser spectroscopy with a cooled He-jet transport system, 8:24174 (R;US)
Mission Research Corp., Albuquerque, NM (USA)
IBEX foilless diode experiments, 8:24187 (R;US)
Intense electron-beam autogenerator, 8:24169 (R;US)
Missouri Univ., Columbia (USA). Dept. of Civil Engineering
Economics of Cherepnov water lifter for low-head hydropower, 8:23244 (R;US)
Theoretical and experimental investigation of the Cherepnov water lifter, 8:23243 (R;US)
Missouri Univ., Kansas City (USA). Dept. of Physics
XPS study of CaO in sodium silicate glass, 8:24030 (R;US)
Missouri Univ., Rolla (USA)
Thermochemical conversion of biomass to synthetic fuels in a large experimental facility. Gasification Research on Wood (GROW) Project, April 1981-March 1982, 8:23270 (R;US)
Mitre Corp., McLean, VA (USA). METREK Div.
GCFM5.0; geothermal field & power plant costs, 8:23378 (R;US)
Mobil Research and Development Corp., Paulsboro, NJ (USA)
Laminar natural convection in an inclined rectangular box with the lower surface half heated and half insulated, 8:23350 (R;US)
Monsanto Research Corp., Miamisburg, OH (USA). Mound
Diallyl phthalate prepolymer characterization and testing in fiberglass filled molding compounds, 8:24019 (R;US)
DWG100RQ;DWG101RQ; convert to or from SI units, 8:25245 (R;US)
Isotachophoresis, 8:24050 (R;US)
MPB Technologies, Inc., Ste-Anne-de-Bellevue, Quebec (Canada)
Transport effects with hot electrons in laser fusion. Final report, October 1, 1981-February 28, 1983, 8:24826 (R;US)
Mueller Associates, Inc., Baltimore, MD (USA)
Solar-project cost report for Howard's Grove School, Howard's Grove, Wisconsin, 8:23347 (R;US)
Muenchen Univ. (Germany, F.R.). Fachbereich Medizin
Epidemiologic investigation of the mercury excretion in the urine of children living in an area of industrial concentration (Western Ruhr District), 8:24410 (R;DE;In German)

N

Nagoya Univ. (Japan). Inst. of Plasma Physics
Tokamak-stellarator hybrid configurations with unlinked helical coils, 8:24832 (R;JP)
Nashville Electric Service, TN (USA)
Cogeneration Energy Recovery Facility feasibility study: project summary, 8:23862 (R;US)
National Academy of Sciences - National Research Council, Washington, DC (USA)
Disposal of low-level radioactive biomedical wastes (an Academy Forum held November 24, 1980), 8:23157 (R;US)
Energy efficiency: the impact of conservation, 8:23792 (R;US)
Surface mining of non-coal minerals. appendix II: mining and processing of oil shale and tar sands. Final report, 8:23081 (R;US)
Toward safer underground coal mines, 8:23009 (R;US)
National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R;US)
National Aeronautics and Space Administration, Washington, DC (USA)
Atmospheric cycles of nitrogen oxides and ammonia, 8:24239 (R;US)
Energy: a continuing bibliography with indexes (issue 29), 8:25286 (R;US)
National Association of Regulatory Utility Commissioners, Washington, DC (USA)
Report of the Ad Hoc Committee on utility diversification. Revised draft report, 8:23720 (R;US)

National Bureau of Standards, Washington, DC (USA)
Determination of incident angle modifiers for flat-plate solar collectors. Final report, 8:23353 (R;US)
Measurements of inelastic scattering of eV neutrons. Final report, 8:24728 (R;US)
National Bureau of Standards, Washington, DC (USA). Center for Building Technology
Performance criteria for solar heating and cooling systems in residential buildings. Building science series (final), 8:23325 (R;US)
National Bureau of Standards, Washington, DC (USA). Synchrotron Ultraviolet Radiation Facility
Effects of resonances in molecular photoionization measured with triply differential photoelectron spectroscopy, 8:24519 (R;US)
Photoelectron spectrometer for high-resolution angular resolved studies, 8:24209 (R;US)
National Cancer Inst., Bethesda, MD (USA). International Cancer Research Data Bank
Excision repair of DNA damage. III. The regulation of excision repair. Oncology overview, 8:24322 (R;US)
National Center for Health Care Technology, Rockville, MD (USA)
An overview of dental radiology: a primer on dental radiology, 8:24390 (R;US)
National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.
High pressure combustor at Leatherhead Test seven results: dolomite size effects, 8:24151 (R;US)
National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)
Review of uranium miners study and statements of outstanding problems. Technical report, 8:24389 (R;US)
The Federal Coal Mine Health program in 1976. Annual report No. 7, 8:23010 (R;US)
National Measurement Lab. (NBS), Washington, DC (USA)
Structure and conductivity of the NASICON analog $Na_3SC_2(PO_4)_3$, 8:24058 (R;US)
National Oceanic and Atmospheric Administration, Washington, DC (USA). Office of Ocean Minerals and Energy
Ocean Thermal Energy Conversion: environmental effects assessment program plan 1981-85, 8:23309 (R;US)
National Power Plant Team, Ann Arbor, MI (USA)
Advanced intake technology for cooling-water intakes: current status and future direction, 8:23409 (R;US)
National Regulatory Research Inst., Columbus, OH (USA)
Funding nuclear-power-plant decommissioning. Final report, 8:23536 (R;US)
Marginal-cost pricing for gas distribution utilities: further analyses and models, 8:23065 (R;US)
National Research Council of Canada, Halifax, Nova Scotia
Application of pyrolysis technology to the utilization of eastern Canadian coals, 8:22900 (R;CA)
National Research Council of Canada, Ottawa, Ontario
Polychlorinated dibenzo-p-dioxins: criteria for their effects on man and his environment, 8:22961 (R;CA)
National Research Council, Washington, DC (USA). Transportation Research Board
Energy involved in construction materials and procedures, 8:23844 (R;US)
National Research Inst. for Metals, Tokyo (Japan)
Interstitial site occupation in ZrNiH, 8:23997 (R;US)
National Solar Heating and Cooling Demonstration Program (DOE), Washington, DC (USA)
Instrumented solar-demonstration systems. Project description summaries, January 1979, 8:23327 (R;US)
Naval Medical Research Inst., Bethesda, MD (USA)
Computer-assisted system for determination of O_2 consumption and CO_2 production in man. Final report, 8:24399 (R;US)
Naval Sea Systems Command, Washington, DC (USA)
A study of the total cost of conventional ship propulsion fuel. Final report FY 1980, 8:23030 (R;US)
Naval Surface Weapons Center, Silver Spring, MD (USA)
Effect of electrolyte water content on the anodic passivation of lithium in 1m lic104-propylene carbonate, 8:23669 (R;US)
Naval Weapons Center, China Lake, CA (USA)
Flat plate photovoltaic power systems: description, design and cost. Summary report, 8:23290 (R;US)
New Mexico State Univ., Las Cruces (USA). Physical Science Lab.
Solar thermochemical energy conversion and transport. Final report 15 Mar 77-30 Sep 82, 8:23255 (R;US)
New Mexico Univ., Albuquerque (USA). Dept. of Chemistry
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R;IT)
New Mexico Univ., Albuquerque (USA). Dept. of Electrical Engineering and Computer Science
High-speed maximum-entropy encoder for images, 8:25276 (R;US)
New Mexico Univ., Albuquerque (USA). Technology Application Center
Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975, 8:23323 (R;US)
New York State Dept. of Health, Albany (USA)
Peptide-induced emesis in dogs: possible relevance to radiation-induced emesis. Final report Oct 80-Sep 81, 8:24358 (R;US)
New York State Electric and Gas Corp., Binghamton (USA)
Upper Mechanicville Hydroelectric Redevelopment Project: project-management plan. Small-Scale Hydroelectric Power Demonstration Project, 8:23245 (R;US)
New York Univ., NY (USA). Courant Inst. of Mathematical Sciences
FASTCAR; solution of Cauchy-Riemann equations, 8:25251 (R;US)
New York Univ., NY (USA). Inst. of Environmental Medicine
In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982, 8:24197 (R;US)
North Carolina Agricultural and Technical State Univ., Greensboro (USA). School of Engineering
Renewable energy system feasibility study. Final report 2 Sep 80-30 Apr 82, 8:23252 (R;US)
North Carolina State Univ., Raleigh (USA)
Continental Shelf processes affecting the oceanography of the South Atlantic Bight. Progress report, June 1978-November 1981, 8:24502 (R;US)
North Carolina State Univ., Raleigh (USA). Dept. of Botany
Ozone impacts on the productivity of selected crops, 8:24403 (R;US)
North Carolina State Univ., Raleigh (USA). Dept. of Physics
Theoretical nuclear reaction and structure studies using kaons and photons. Progress report, 1 February 1982-31 January 1983, 8:24641 (R;US)
North Dakota State Univ., Fargo (USA). Dept. of Agricultural Economics
Methods for assessing the socioeconomic impacts of large-scale resource developments: implications for nuclear repository siting, 8:24303 (R;US)
North Dakota Univ., Grand Forks (USA)
Review of low-rank-coal AFBC testing, 8:22996 (R;US)
Northeast Solar Energy Center, Boston, MA (USA)
FCHART/SLR2.0; solar heating system performance, 8:23311 (R;US)
Northwestern Univ., Evanston, IL (USA)
Metamagnetism of palladium, 8:23894 (R;US)
Threshold energy surface and Frenkel-pair resistivity for Cu, 8:23948 (R;US)
Northwestern Univ., Evanston, IL (USA). Dept. of Chemical Engineering
Effect of the rate of adsorption at oil-water interface upon the displacement of residual oil, 8:23019 (R;US)
Northwestern Univ., Evanston, IL (USA). Dept. of Chemistry
ABCD; atom-triatom nonreactive collisions, 8:24511 (R;US)
Northwestern Univ., Evanston, IL (USA). Dept. of Materials Science and Engineering
Re-examination of the threshold energy surface in copper, 8:23935 (R;US)
Northwestern Univ., Evanston, IL (USA). Dept. of Physics
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R;US)
Nuclear Materials, Inc., Concord, MA (USA)
Depleted uranium test range fragment reclamation. Final report Nov 81-Jun 82, 8:23104 (R;US)
Nuclear Regulatory Commission, King of Prussia, PA (USA). Region I
NRC TLD Direct Radiation-Monitoring Network. Progress report, July-September 1982, 8:24264 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Div. of Automatic Data Processing
XOQDOQ; nuclear power plant effluent releases, 8:23572 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Div. of Safeguards
Safeguards Summary Event List (SSEL), 8:23195 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control
Regulatory and technical reports, 8:23524 (R;US)
Title list of documents made publicly available, December 1-31, 1982, 8:23525 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Material Safety and Safeguards
Acceptance criteria for determining armed response force size at nuclear power plants, 8:23196 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation
Safety evaluation report: related to the operation of Seabrook Station, Units 1 and 2, Docket Nos. 50-443 and 50-444, Public Service Company of New Hampshire, et al., 8:23623 (R;US)
Safety evaluation report related to the operation of Palo Verde Nuclear Generating Station, Units, 1, 2, and 3: Docket Nos. STN 50-528, STN 50-529, and STN 50-530, 8:23528 (R;US)
Safety Evaluation Report related to the operation of Comanche Peak Steam Electric Station, Units 1 and 2. Docket Nos. 50-445 and 50-446, 8:23622 (R;US)
Safety-evaluation report related to operation of McGuire Nuclear Station, Units 1 and 2. Docket Nos. 50-369 and 50-370, 8:23621 (R;US)
Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537, 8:23625 (R;US)
Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537, 8:23626 (R;US)
Safety-Evaluation Report related to the D2/D3 steam-generator design modification, 8:23624 (R;US)
Technical specifications: McGuire Nuclear Station, Unit Nos. 1 and 2. Docket Nos. 50-369 and 50-370, 8:23529 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research
FRANTIC-NRC; time-dependent system unavailability, 8:25236 (R;US)
Geophysical investigations of the Western Ohio-Indiana region. Annual report, October 1981-September 1982, 8:24492 (R;US)
Standard format and content of license applications, including environmental reports, for in-situ uranium solution mining, 8:23102 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management
Licensed operating reactors. Status summary report data as of October 31, 1982, 8:23523 (R;US)
Operating reactors licensing actions summary, 8:23527 (R;US)
Regulatory licensing status summary report. Nuclear power plants data for decisions (blue book), February 1-February 28, 1983, 8:23526 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of State Programs
Information report on state legislation, 8:23149 (R;US)

O

Oak Ridge Associated Universities, Inc., TN (USA)
High spins in gamma-soft nuclei, 8:24704 (R;US)
Radiation-dosimetry and chemical-toxicity considerations for ^{99}Tc, 8:24404 (R;US)
Role of M1 transitions in the quasicontinuum, 8:24672 (R;US)
Towards intrinsically safe light-water reactors, 8:23637 (R;US)
Oak Ridge Gaseous Diffusion Plant, TN (USA)
Gamma-ray spectrometric determination of UF_6 assay with 1 percent precision for international safeguards. Part 1: product and feed in 1S and 2S sample cylinders, 8:23191 (R;US)
Green's function for Onsager's pancake equation, 8:23103 (R;US)
PCTEST; principal component test for outliers, 8:25237 (R;US)
Oak Ridge National Lab., TN (USA)
Anomalous electron-attachment properties of perfluoropropylene (1-C_3F_6) and their effect on the breakdown strength of this gas, 8:24523 (R;US)
Assessment of load-frequency-control impacts caused by small wind turbines, 8:23393 (R;US)
BONAMI-S: response self-shielding by the Bondarenko method. Volume 2. Functional studies, 8:23543 (R;US)
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R;US)
Concentration, serotypic profiles, and infectivity of Legionnaires' Disease bacteria populations in cooling towers, 8:24349 (R;US)
CONSEPT; controller-run solvent extraction, 8:23110 (R;US)
Crack and cavity nucleation at interfaces during creep, 8:23938 (R;US)
CREEP-PLAST2; 2-dimensional inelastic structural analysis, 8:24090 (R;US)
CURT2; curved tubes or elbows & attached pipes, 8:24084 (R;US)
Diffusion of hydrogen in yttrium, 8:23553 (TJ;US)
Electron-attachment processes, 8:24524 (R;US)
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R;US)
GRFPAK; plot package for CORTES FEM programs, 8:24086 (R;US)
MESA; maximum entropy time series analysis, 8:25250 (R;US)
MSF21;VTE21; desalination plant optimization, 8:24088 (R;US)
Ozone impacts on the productivity of selected crops, 8:24403 (R;US)
PICES; utility static generation reliability, 8:23401 (R;US)
PREMOR; two-group point reactor power plant model, 8:23540 (R;US)
PRODCOST; utility generating cost simulation, 8:23403 (R;US)
RATEPAC; power plant revenue requirements code, 8:23405 (R;US)
Release of fission products from irradiated aluminide fuel at high temperature, 8:23604 (R;US)
STOPS; power system short-term optimization, 8:23402 (R;US)
Study of coexistence of ferromagnetism and superconductivity in single-crystal $ErRh_4B_4$, 8:23996 (R;US)
SULCAL; model of sulfur chemistry in a plume, 8:24228 (R;US)
Workshop on cognitive modeling of nuclear-plant control-room operators, 8:23556 (R;US)
Office of Radiation Programs, Las Vegas, NV (USA)
Basic technique and models for determining exposure rates over uranium-bearing soils. Final report, 8:23185 (R;US)
Office of Radiation Programs, Washington, DC (USA)
Final environmental impact statement for remedial action standards for inactive uranium processing sites (40 CFR 192) Volume I. Final report, 8:23186 (R;US)
Ohio State Univ., Columbus (USA)
Oil persistence in tundra and its impact on the below-ground ecosystem. Final report, 8:23039 (R;US)
Okayama Univ. (Japan). Dept. of Industrial and Mechanical Engineering
Laminar natural convection in an inclined rectangular box with the lower surface half heated and half insulated, 8:23350 (R;US)
Old Dominion Univ., Norfolk, VA (USA). Research Foundation
Fate of chlorine in seawater. Final report, August 1, 1977-January 31, 1981, 8:24268 (R;US)
Omaha Public Power District, NE (USA)
Evaluation and demonstration of methods for improved fuel utilization: Fort Calhoun spent-fuel-pool cleanup following a spill of hydraulic fluid containing glycol, 8:23471 (R;US)
Evaluation and demonstration of methods for improved fuel utilization. Sixth semi-annual progress report, April 1, 1982-September 30, 1982, 8:23472 (R;US)
One America, Inc., Washington, DC
ADP requirements study report. Volume 1. ADP requirements statement, 8:25269 (R;US)
ADP Requirements Study Report. Volume II. Appendices A, B, C and D, 8:25288 (R;US)
ADP requirements study report. Volume III. Appendix E, 8:25287 (R;US)
ADP requirements study report. Volume IV. Analysis of alternative options: projected ADP requirements, 8:25270 (R;US)
ADP requirements study report. Volume V. Procurement specifications statement, 8:25271 (R;US)
Open Univ., Milton Keynes (UK). Alternative Technology Group
Appropriate technologies for basic energy needs in rural India. Working paper, 8:23759 (R;US)
Family and community biogas plants in rural India and China, 8:23222 (R;US)

Oral Roberts Univ., Tulsa, OK (USA)
Cogeneration and emission offsets in nonattainment areas, 8:23700 (R;US)
Numerical modeling of massive hydraulic fractures. First annual report, September 1980-August 1981, 8:24497 (R;US)
Oregon State Univ., Corvallis (USA)
Remote sensing for wind power potential: a prospector's handbook, 8:23388 (R;US)
Oregon Univ., Eugene (USA). Inst. of Theoretical Science
Flavor-changing electromagnetic transitions, 8:24606 (R;US)
Polarization structure of reactions at theta/sub C.M./ = $\pi/2$, 8:24637 (R;US)
Status of theories of CP non-invariance, 8:24631 (R;US)

P

Pacific Northwest Lab., Richland, WA (USA)
Actinide-solubility controls in performance assessment of nuclear-waste repositories, 8:23168 (R;US)
Byproduct inventories, 8:23171 (R;US)
Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository, 8:23166 (R;US)
COVE1; creep collapse for oval fuel pin tube, 8:23555 (R;US)
Decision-tree approach to evaluating inactive uranium-processing sites for liner requirements, 8:23161 (R;US)
Design and performance of feed-delivery systems for simulated radioactive waste slurries, 8:23160 (R;US)
Design surface covers: an approach to long-term waste site stabilization, 8:23172 (R;US)
Evaluation of selected neutralizing agents for the treatment of uranium tailings leachates. Laboratory progress report, 8:23152 (R;US)
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R;US)
Existing programs, technology, and requirements relative to the conservation and protection of marine mammals in the US fishery conservation zone and in the southern ocean, 8:24271 (R;US)
Fatigue-crack monitoring in-flight using acoustic emission - hardware, technique, and testing, 8:24142 (R;US)
Field and laboratory evaluation of the mobility of cobalt-60/EDTA in an arid environment, 8:23167 (R;US)
Fourteenth annual report radiation exposures for DOE and DOE contractor employees - 1981, 8:24365 (R;US)
GAPCON-THERMAL3; fuel steady state & transient behavior, 8:23554 (R;US)
GEOCITY; geothermal district heating economics, 8:23384 (R;US)
Hanford-worker health study: a status report, 8:24391 (R;US)
High-temperature leaching of an actinide-bearing, simulated high-level waste glass, 8:23159 (R;US)
Hydrodeoxygenation of phenolic components of wood-derived oil, 8:23279 (R;US)
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R;US)
Investigation of combined heat and mass transfer from a wet heat exchanger. Part 1. Formulation of an approximate heat/mass transfer model for calculating the performance of heat exchangers in dry/wet operation, 8:24110 (R;US)
Iodine-fixation studies at the Pacific Northwest Laboratory, 8:23165 (R;US)
Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R;US)
Learning to forecast wind at remote sites for wind-energy applications. Final report, 8:23394 (R;US)
Long-term simulation of sediment and contaminant transport, 8:24291 (R;US)
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R;US)
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R;US)
Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R;US)
Potential for beneficial use of krypton-85, 8:23170 (R;US)
Potential for large-scale uses for fission-product Xenon, 8:23105 (R;US)
Reactor-safety research programs. Quarterly report, July-September 1982, 8:23549 (R;US)
Review of environmental studies and issues on compressed-air energy storage, 8:23659 (R;US)
Technical and economic feasibility of salt-gradient solar ponds at the Truscott Brine Lake of the Red River Chloride Control Project. A report to the House-Senate Committee on Appropriations of the Ninety-Seventh Congress, 8:23306 (R;US)
Technology for recovery of byproducts, 8:23173 (R;US)
Thermodynamic analysis of five compressed-air energy-storage cycles, 8:23660 (R;US)
Unsteady-flow model of Priest Rapids Dam releases at Hanford Reach, Columbia River, Washington, 8:24270 (R;US)
Using process instrumentation to obviate destructive examination of canisters of HLW glass, 8:23169 (R;US)
PEDCo-Environmental, Inc., Cincinnati, OH (USA)
Flue gas desulfurization information system data base user's manual, 8:24241 (R;US)
Pennsylvania State Univ., University Park (USA)
Transmission and backscatter Moessbauer spectroscopy of zeolite Fe (and Fe-Co) synfuel catalysts, 8:24057 (R;US)
Pennsylvania State Univ., University Park (USA). Dept. of Mechanical Engineering
Friction factor correlation for the offset strip-fin matrix, 8:24104 (R;US)
Heat-exchanger needs for recovering waste heat in the glass-making industry. Final report, 8:23861 (R;US)
Prediction of the friction factor for the offset strip-fin matrix, 8:24105 (R;US)
Pennsylvania Univ., Philadelphia (USA)
Laminar natural convection in an inclined rectangular box with the lower surface half heated and half insulated, 8:23350 (R;US)
Pittsburgh Univ., PA (USA)
Development of a dc current limiting interrupting system for mines. Open file report Jun 79-Sep 81, 8:24109 (R;US)
Pittsburgh Univ., PA (USA). Dept. of Civil Engineering
Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R;US)
Kinetics of anaerobic decomposition of phenol, 8:22949 (R;US)
Pittsburgh Univ., PA (USA). Dept. of Industrial Engineering
Comparison of algorithms for computing generating-system reliability indexes. Final report, 8:23745 (R;US)
Pittsburgh Univ., PA (USA). Dept. of Metallurgical and Materials Engineering
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R;US)
Planning Research Corp., McLean, VA (USA)
Foreign applications and export potential for wind-energy systems, 8:23761 (R;US)
Policy Planning and Evaluation, Inc., McLean, VA (USA)
Documentation of International Energy Evaluation System, 8:23712 (R;US)
Documentation of International Energy Evaluation System. Volume 1. Overview, 8:23687 (R;US)
Documentation of International Energy Evaluation System. Volume 2, 8:23688 (R;US)
Documentation of International Energy-Evaluation System, 8:23689 (R;US)
Polytechnic Inst. of New York, Farmingdale (USA)
Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R;US)
Power Technologies, Inc., Schenectady, NY (USA)
Increasing pipe-cable section lengths. Final report, 8:23436 (R;US)
Princeton Univ., NJ (USA). Plasma Physics Lab.
Conditioning of ion sources for mass spectrometry of plasmas, 8:24769 (R;US)
Effects of toroidicity on resistive tearing modes, 8:24768 (R;US)
Lower hybrid heating and current drive on PLT, 8:24766 (R;US)
Operating tokamaks with steady-state toroidal current, 8:24765 (R;US)
Ray-tracing study of electron-cyclotron heating in toroidal geometry, 8:24767 (R;US)
Some novel features of the ordinary-mode electron-cyclotron resonance heating of tokamak plasmas, 8:24771 (R;US)

Spectra of germanium and selenium in the 50-350 A region from the PLT tokamak plasma, 8:24770 (R;US)
Time-dependent drift Hamiltonian, 8:24772 (R;US)
Purdue Univ., Lafayette, IN (USA)
Shell structure at high spin and the influence on nuclear shapes, 8:24681 (R;US)
Purdue Univ., Lafayette, IN (USA). Dept. of Computer Science
2DEPEP; elliptic, parabolic & eigenvalue solutions., 8:25244 (R;US)
Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering
Heat transfer to water from a vertical tube bundle under natural-circulation conditions, 8:23635 (R;US)
Purvin and Gertz, Inc., Dallas, TX (USA)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume III. Market analysis, 8:23230 (R;US)
Pyros, Inc., Gaithersburg, MD (USA)
Future world oil prices: review of current forecasts, identification of price-determining factors, and delineation of a quantitative framework for analysis, 8:23035 (R;US)

R

Radian Corp., Austin, TX (USA)
Effect of trace metals and sulfite oxidation of adipic acid degradation in FGD systems. Final report Dec 81-May 82, 8:22957 (R;US)
Radiation Effects Research Foundation, Hiroshima (Japan)
Breast cancer among atomic bomb survivors, Hiroshima and Nagasaki, 1950-1969. Pathologic features, 8:24357 (R;US)
Radiation Effects Research Foundation, Nagasaki (Japan). Nagasaki Branch
Breast cancer among atomic bomb survivors, Hiroshima and Nagasaki, 1950-1969. Pathologic features, 8:24357 (R;US)
RAND Corp., Santa Monica, CA (USA)
Energy security in the industrial nations, 8:23723 (R;US)
Selected papers from the energy workshop: industry perspectives on pioneer process plants, 8:23750 (R;US)
Rasor Associates, Inc., Sunnyvale, CA (USA)
Thermionic cogeneration burner assessment study. First quarterly technical progress report, October-December, 1982, 8:23858 (R;US)
Reactor Research Centre, Kalpakkam (India)
DOPSEL; self-shielding in the resonance region, 8:24702 (R;US)
Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Geology
Deep-burial diagenesis. Annual progress report, 1982-1983, 8:24498 (R;US)
Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Nuclear Engineering
ALVIN; differential-integral data consistency, 8:24639 (R;US)
Research Planning Inst., Inc., Columbia, SC (USA)
Persistance of Metula oil in the Strait of Magellan six and one-half years after the incident. Final report, 8:23041 (R;US)
Resource Transitions, Inc., Santa Cruz, CA (USA)
Energy future Santa Cruz. A citizens' plan for energy self-reliance: executive summary, 8:23791 (R;US)
Resucitation Research Lab., Camarillo, CA (USA)
Definitive studies on pole-top resuscitation. Final report, 8:24481 (R;US)
Reutter (John G.) Associates, Camden, NJ (USA)
Review and evaluation of a bioconversion-process demonstration plant and its related technologies, 8:23874 (R;US)
Rhone-Poulenc SA, 75 - Paris (Frnce)
Optimization of adsorbate-absorbent couples. Final report, 8:23321 (R;XE;FR)
Rice Univ., Houston, TX (USA)
Proceedings of the workshop on muon science and facilities at Los Alamos, 8:24545 (R;US)
Rice Univ., Houston, TX (USA). Dept. of Chemistry
Infrared absorption spectroscopy with color-center lasers. Progress report, April 1 1982-February 15, 1983, 8:24081 (R;US)
Rockefeller Univ., New York (USA)
Performance of a high-pressure-hydrogen time-projection chamber, 8:24196 (R;US)
Rockefeller Univ., New York (USA). Dept. of Experimental Physics
High p/sub T/ $\pi 0$ production with $\alpha\alpha$ and αp beams at the CERN ISR, 8:24577 (R;US)
Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group
STESEP; solar total energy system evaluation, 8:23297 (R;US)
Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant
Behavior of tetravalent plutonium with various ion exchangers in solutions containing nitric acid and oxalates, 8:24053 (TG;US)
Ferromagnetic porous plastics, 8:24023 (TG;US)
GLOVE CHANGE ANALYSIS SYSTEM; glove data base, 8:24091 (R;US)
Long-range Rocky Flats utilization study, 8:24219 (R;US)
Magnetic powder for treatment of oil-polluted waste water and process for manufacturing the powder, 8:23975 (TG;US)
McDonnell 40-kW Giromill wind system: Phase I. Design and analysis. Volume I. Executive summary, 8:23395 (R;US)
Novel diphosphonic and triphosphonic esters and their preparation and uses, 8:24070 (TG;US)
Process for removal of organic solvents, 8:24054 (TG;US)
Waste-water treatment apparatus, 8:24147 (TG;US)
Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations
Experimental investigation of sodium bentonite stability in Hanford basalt, 8:23174 (R;US)
Summary of past Basalt Waste Isolation Project overviews during preliminary site characterization, 8:23175 (R;US)
Ruhrgas A.G., Essen (Germany, F.R.)
Project study gas, tar and oil production by devolatilization of power station coal, 8:22913 (R;DE;In German)
Ruhrkohle A.G., Essen (Germany, F.R.)
Project study gas, tar and oil production by devolatilization of power station coal, 8:22913 (R;DE;In German)

S

Saint Martin, Iberia, Lafayette Community Action Agency, Inc., LA (USA)
Self-help energy conservation programs for low-income groups: the SMILE experience, 8:23826 (R;US)
Sandia National Labs., Albuquerque, NM (USA)
BLOCKS: a block-motion code for geomechanics studies, 8:24493 (R;US)
Characteristics and development report for the MC3573 thermal battery, 8:23682 (R;US)
Cherenkov light as a current-density diagnostic for large-area, repetitively pulsed electron beams, 8:24186 (R;US)
COREL;RASE4;DAMG2; ion implantation deposition, 8:24718 (R;US)
CRAC calculations for accident sections of environmental statements, 8:23633 (R;US)
Development of modifications for Coflexip flexible drilling pipe for high-temperature and -pressure geothermal service. Final report, 8:23383 (R;US)
Efficient extrapolation methods for ODEs, 8:25277 (R;US)
Electron-channeling radiation: x-ray source feasibility study, 8:24729 (R;US)
Fracture toughness of PWR-components supports, 8:23505 (R;US)
Full-scale turbine-missile concrete impact experiments. Final report, 8:23610 (R;US)
Grayloc seal static tests, 8:24112 (R;US)
High-energy gas-fracturing development. Quarterly report, October-December 1982, 8:23077 (R;US)
High-speed maximum-entropy encoder for images, 8:25276 (R;US)
IBEX foilless diode experiments, 8:24187 (R;US)
IFA-2 collective-ion-accelerator system, 8:24188 (R;US)
In-plant considerations for optimal offsite response to reactor accidents, 8:23574 (R;US)
Intense electron-beam autogenerator, 8:24169 (R;US)
Interim Reliability Evaluation Program procedures guide, 8:23629 (R;US)
Intermediate photovoltaic system application experiment operational performance report. Volume 15. For Beverly High School, Beverly, MA for November 1982, 8:23294 (R;US)
MAEROS user manual, 8:23627 (R;US)

Mineralogy and petrology aspects of Mesaverde Formation at Rifle Gap, Colorado, specific to the sedimentology and gas-bearing intervals in the subsurface, 8:23060 (R;US)
Multistage pulsed-power electron accelerators, 8:24185 (R;US)
Oil-shale Program. Twenty-sixth quarterly report, April 1982-June 1982, 8:23082 (R;US)
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R;US)
Quasi-steady model for predicting temperature of aqueous foams circulating in geothermal wellbores, 8:23382 (R;US)
RADTRAN II user guide, 8:23117 (R;US)
RELAP5 assessment: FLECHT SEASET steam-generator test 23402, 8:23632 (R;US)
Sandia technology, 8:23882 (R;US)
Sewage Solids Irradiator Transportation System (SSITS) cask: preliminary design description, 8:24113 (R;US)
Spectral and spatial studies of shock-induced luminescence from quartz, 8:24007 (R;US)
Stored-data acquisition system, 8:25278 (R;US)
Study and full-scale test of a high-velocity grade-crossing simulated accident of a locomotive and a nuclear-spent-fuel shipping cask, 8:24111 (R;US)
Summary of the Plant Electrical Systems (PES) Study, 8:23550 (R;US)
SWAP9; stress-wave analysis in 1-dimensional strain, 8:24092 (R;US)
Time depdendent crack growth and failure in brittle rock, 8:24500 (R;US)
Time-resolved measurements of hydrogen and deuterium fluxes in the ASDEX plasma boundary, 8:24775 (R;US)
Wind-energy battery-storage project. Phase I. Final report, 8:23396 (R;US)

Sandia National Labs., Livermore, CA (USA)
Economies of scale in the production of steam with solar thermal-fossil boiler hybrid systems, 8:23253 (R;US)
Fortran computer-code package for the evaluation of gas-phase viscosities, conductivities, and diffusion coefficients, 8:24137 (R;US)
Investor and federal treasury returns from investing in solar-thermal energy, 8:23307 (R;US)
Real-time total-mass analysis of particulates in the stack of an industrial power plant, 8:24242 (R;US)
SHOCK; dynamic response of lumped-mass systems, 8:24087 (R;US)

Science Applications, Inc., Boulder, CO (USA). Plasma Research Inst.
Criterion for Baldwin instability in a symmetric tandem mirror with hot-electron end plugs, 8:24774 (R;US)

Science Applications, Inc., Fort Collins, CO (USA)
Evaluation of stimulation technologies in the Eastern Gas Shales Project, 8:23073 (R;US)

Science Applications, Inc., Golden, CO (USA)
Photovoltaic requirements estimation - a simplified method. Final report, 8:23292 (R;US)

Science Applications, Inc., Huntsville, AL (USA)
Solar-energy-system performance evaluation. Reedy Creek Utility District office building, Lake Buena Vista, Florida, September 1978-February, 1979, 8:23343 (R;US)

Science Applications, Inc., La Jolla, CA (USA)
Interim Reliability Evaluation Program procedures guide, 8:23629 (R;US)

Science Applications, Inc., McLean, VA (USA)
Analysis of radiation exposure for troop observers, Exercise Desert Rock VI, Operation Teapot. Final report 1 Mar-15 Jul 80, 8:24359 (R;US)
Analysis of radiation exposure, 4th Marine Corps provisional atomic exercise brigade, exercise Desert Rock VII, Operation Plumbbob. Final report 1 Mar 80-15 Jun 81, 8:24360 (R;US)
Interim Reliability Evaluation Program procedures guide, 8:23629 (R;US)

Science Applications, Inc., Morgantown, WV (USA)
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R;US)
Modeling of Devonian shale gas reservoirs. Task 16. Mathematical modeling of shale gas production (2D model). Final report, 8:23053 (R;US)
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R;US)

Science Applications, Inc., Palo Alto, CA (USA)
Comparison of COMETHE-IIIJ and FCODE-BETA fission gas-release predictions with measurements. Final report, 8:23466 (R;US)

Scripps Institution of Oceanography, San Diego, CA (USA)
Possible changes in global sea level and their potential causes, 8:24269 (R;US)

Scripps Institution of Oceanography, San Diego, CA (USA). Marine Physical Lab.
Deep-towed RUM III: a third-generation remote underwater manipulator, 8:24156 (R;US)

SCS Engineers, Inc., Long Beach, CA (USA)
Resource recovery technology application document. Final report, 8:23870 (R;US)

Seaworthy Engine Systems, Inc., Essex, CT (USA)
Shoreside boiler demonstration of fuel-water emulsions. Final report Mar 80-Aug 82, 8:23047 (R;US)

Sentralinstitutt for Industriell Forskning, Oslo (Norway)
Polycyclic aromatic hydrocarbons in Danish leafy crops. Part I: PAH in kale and beets relate to point sources of PAH. Part II: a survey of PAH in commercial grown fresh and deep-frozen kale, 8:24257 (R;US)

Sidney Farber Cancer Center, Inc., Boston, MA (USA)
Radiation therapy: model standards for determination of need, 8:24341 (R;US)

Sierra Geophysics, Inc., Redmond, WA (USA)
Investigations of near-source structural effects on body waves. Part II. Yucca Flats; receiver functions appropriate to NTS; motive functional specifications. Annual technical report, 8:24221 (R;US)

Siltec Corp., Menlo Park, CA (USA)
LSA large area silicon sheet task enhanced I.D. slicing. Quarterly report No. 7, July-September 1980, 8:23266 (R;US)

Solar Energy Research Inst., Golden, CO (USA)
Class B performance monitoring of passive/hybrid solar buildings, 8:23326 (R;US)
Extensive modeled terrestrial solar spectral data sets with solar-cell analysis, 8:23281 (R;US)
Solar Energy Research Institute's daylighting laboratory, 8:23827 (R;US)
Wind data for building ventilation in selected US cities, 8:23828 (R;US)

Solarex Corp., Rockville, MD (USA)
Module experimental process system development unit (MEPSDU). Summary technical report, November 26, 1980-February 23, 1982, 8:23268 (R;US)

Solar Turbines, Inc., San Diego, CA (USA)
Ceramic-heat-exchanger technology. Final report, 8:23418 (R;US)

Southeastern Center for Electrical Engineering Education, Inc., Orlando, FL (USA)
Effects of electromagnetic radiation on calcium in the brain. Technical report, 8:24477 (R;US)

Southern Illinois Univ., Carbondale (USA). Dept. of Thermal and Environmental Engineering
U-25B MHD-generator performance, 8:23768 (R;US)

Southwest Research Inst., San Antonio, TX (USA). Applied Physics Div.
Investigation of pulsation in slurry-pumping systems in coal-liquefaction plants. Final report, 8:22929 (R;US)

Southwest Research Inst., San Antonio, TX (USA). Energy System Research Div.
Effect of low-proof alcohol utilization to supplement diesel fuel on engines life expectancy: Caterpillar 3306 PCI. Final report, 8:23880 (R;US)
Effect of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: International Harvester D436. Final report, 8:23881 (R;US)
Effects of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: John Deere 6466T. Final report, 8:23879 (R;US)

SRI International, Menlo Park, CA (USA)
Scale modeling of turbine-missile impact into concrete. Final report, 8:23611 (R;US)

Stanford Linear Accelerator Center, CA (USA)
EGUN; calculation of electron trajectories, 8:24167 (R;US)
TRANSPORT; design of charged particle beams, 8:24165 (R;US)

Stanford Univ., CA (USA)
0^- to 0^+ beta decay in A = 16, 8:24644 (R;US)

Stanford Univ., CA (USA). Dept. of Geophysics
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R;US)

Stanford Univ., CA (USA). School of Engineering
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R;US)
Statens Provningsanstalt, Boraes (Sweden)
Sp-c12-301: thermal performances of solar energy absorbers, 8:23354 (R;US;SW)
Statistik der Kohlenwirtschaft e.V., Essen (Germany, F.R.)
Coal mining in the West German power industry in 1981, 8:22979 (R;DE;In German)
STEAG A.G., Essen (Germany, F.R.)
Further development on a 170 MW prototype plant with pressurized coal gasification and gas-/steam turbine power plant at Luenen, 8:22912 (R;DE;In German)
Project study gas, tar and oil production by devolatilization of power station coal, 8:22913 (R;DE;In German)
Stevenson and Associates, Cleveland, OH (USA)
Selected review and evaluation of US safety research vis-a-vis foreign safety research for nuclear power plants, 8:23636 (R;US)
Stichting Energieonderzoek Centrum Nederland, Petten
Determination of environment parameters for SELPE, a model for energy supply, 8:22959 (R;NL;In Dutch)
Industrial fuel applications. Furnaces and dryers, 8:23000 (R;NL;In Dutch)
Stichting voor Fundamenteel Onderzoek der Materie, Jutphaas (Netherlands). Inst. voor Plasma-Fysica
Proposal for time-resolved ion temperature measurements by means of Rutherford scattering of the JET heating beams, 8:24773 (R;NL)
Summary of processes relevant for the particle balance of a cold plasma blanket contaminated with a small amount of helium, 8:24837 (R;NL)
Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme
Chances of continued heat and power generation in public power stations in combination with district heating, 8:23747 (R;DE;In German)
Re-evaluation of the neutron scattering dynamics in heavy water, generation of multigroup cross sections for THERM-126, 8:24724 (R;DE)
Sueddeutsche Metallwerke G.m.b.H., Walldorf (Germany, F.R.)
Latent heat storage for solar energy systems, 8:23357 (R;XE;GE)
Sveriges Lantbruksuniversitet, Uppsala. Institutionen foer Virkeslaera
Studie kring maetning av traedrester vid Nydo Energi i hissmofors (a study of measuring wood residues at nydo energy ltd.), 8:23278 (R;US)
Syracuse Research Corp., NY (USA)
State-local relations and urban technology: a study in intergovernmental decision making - executive summary, 8:24304 (R;US)
State-local relations and urban technology: a study in intergovernmental decision making, 8:24305 (R;US)
Systems Applications, Inc., San Rafael, CA (USA)
Survey of plume models for atmospheric application, 8:24225 (R;US)
Systems Control, Inc., Palo Alto, CA (USA)
Assessment of load-frequency-control impacts caused by small wind turbines, 8:23393 (R;US)
Systems Technology Corp., Xenia, OH (USA)
Energy recovery from the effluent of plants anaerobically digesting urban solid waste, 8:23876 (R;US)

T

Technion-Israel Inst. of Tech., Haifa. Faculty of Mechanical Engineering
Halo-thermal simulation of the Dead Sea, 8:24503 (R;IL)
Technische Univ., Vienna (Austria)
Time-resolved measurements of hydrogen and deuterium fluxes in the ASDEX plasma boundary, 8:24775 (R;US)
Teledyne Energy Systems, Timonium, MD (USA)
Heat-source specification 500 watt(e) RTG, 8:23201 (R;US)
Teledyne Geotech, Alexandria, VA (USA)
Analysis of seismic data at RSTN sites and high-frequency seismic signals at TFSO, 8:24494 (R;US)
Relationship of body and surface wave magnitudes for small earthquakes and explosions. Scientific report, 8:24223 (R;US)
Tempe Union High School District No. 213, AZ (USA)
Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report, 8:23320 (R;US)
Tennessee Univ., Knoxville (USA)
Correlation of FCHART 4.0 with solar/heat-pump systems, 8:23317 (R;US)
High spins in gamma-soft nuclei, 8:24704 (R;US)
TRNSYS/GROCS simulation of the TECH House I ground-coupled-series solar-assisted heat-pump system, 8:23318 (R;US)
Tennessee Univ., Knoxville (USA). Dept. of Physics
Electron affinities of atoms, molecules, and radicals, 8:24525 (R;US)
Electron-attachment processes, 8:24524 (R;US)
Role of M1 transitions in the quasicontinuum, 8:24672 (R;US)
Tennessee Univ., Knoxville (USA). Dept. of Physics and Astronomy
Interaction of slow electrons with high-pressure gases ('Quasi-liquids'): synthesis of our knowledge on slow electron-molecule interactions. Progress report, 8:24526 (R;US)
Tennessee Univ., Knoxville (USA). Dept. of Zoology and Entomology
Concentration, serotypic profiles, and infectivity of Legionnaires' Disease bacteria populations in cooling towers, 8:24349 (R;US)
Tennessee Univ., Tullahoma (USA). Space Inst.
Evaluation of a modified-line-reversal temperature measurement in coal-fired MHD plasmas, 8:23774 (R;US)
MIE scattering theory for particle sizing interferometry with the dual beam laser velocimeter, 8:23773 (R;US)
Tennessee Valley Authority, Chattanooga (USA)
Energy management annual report. Fiscal year 1982, 8:23710 (R;US)
Solid waste management at fossil plants, 8:22948 (R;US)
Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology
Real-time total-mass analysis of particulates in the stack of an industrial power plant, 8:24242 (R;US)
Reclamation of transformer oils containing PCBs by the Sunohio PCBX Process. Final report, 8:23038 (R;US)
Tennessee Valley Authority, Chattanooga (USA). Office of Power
1981 commercial and industrial survey: customers of municipal and cooperative distributors of TVA power, 8:23752 (R;US)
Tennessee Valley Authority, Chattanooga (USA). Power System Operations
Use of oscillograph records for analyzing system performance, 8:23440 (R;US)
Tennessee Valley Authority, Norris (USA)
Utilization of surface mine ponds in East Tennessee by breeding amphibians. Final report, 8:24454 (R;US)
Tennessee Valley Authority, Norris (USA). Div. of Land and Forest Resources
Surface mine reclamation for wildlife: a model reclamation plan for southern Appalachia. Final report, 8:22964 (R;US)
User's manual for the Caretaker Information System. Version 1.2, 8:24354 (R;US)
User's Manual for the TVA Lumber Yield and Value File Utility Program. Version 1.0, 8:24356 (R;US)
Tennessee Valley Authority, Norris (USA). Office of Natural Resources
Activity-Reporting System User's Manual. Version 1.2, 8:24355 (R;US)
Terra Tek, Inc., Salt Lake City, UT (USA)
Development of an instrument to measure the concentration of noncondensable gases in geothermal discharges. Final report, October 1, 1978-September 30, 1979, 8:23373 (R;US)
Tetra Tech, Inc., Lafayette, CA (USA)
Integrated lake-watershed acidification study: proceedings of the ILWAS annual review conference, 8:24280 (R;US)
Texas A and M Univ., College Station (USA)
10-kA pulsed power supply for superconducting coils, 8:24821 (R;US)
Texas A and M Univ., College Station (USA). Dept. of Rural Sociology
Methods for assessing the socioeconomic impacts of large-scale resource developments: implications for nuclear repository siting, 8:24303 (R;US)
Texas Univ., Arlington (USA). Public Transportation Center
PRPLOT; line printer plot subroutine package, 8:25238 (R;US)
Texas Univ., Austin (USA)
Kinetic theory of Alfven waves, 8:24762 (R;US)

Texas Univ., Austin (USA). School of Architecture
Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982, 8:23804 (R;US)
Thermacon, Atlanta, GA (USA)
Oxy-fuel burner development program. Final report Jul 81-May 82, 8:24154 (R;US)
Timmerman Engineering Co., Inc., Phoenix, AZ (USA)
Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report, 8:23320 (R;US)
Tishman Research Corp., New York (USA)
Occupancy-controlled lighting: energy-savings demonstration and analysis, 8:23825 (R;US)
Tribhuvan Univ., Kathmandu (Nepal). Research Centre for Applied Science and Technology
Sample survey of traditional water wheels and small water turbines in nepal: a preliminary report, 8:23242 (R;US)
Tufts Univ., Medford, MA (USA). Dept. of Physics
Polarization structure of reactions at theta/sub C.M./ = $\pi/2$, 8:24637 (R;US)
Turin Univ. (Italy). Ist. di Calcoli Numerici
Note on cubature over a triangle of a function having specified singularities, 8:25268 (R;US)

U

UKAEA Atomic Energy Establishment, Winfrith
PFR/TREAT CO1 and LO1 experiments, 8:23593 (R;US)
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R;US)
UKAEA Atomic Energy Research Establishment, Harwell
PFR/TREAT CO1 and LO1 experiments, 8:23593 (R;US)
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R;US)
UKAEA Dounreay Nuclear Power Development Establishment
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R;US)
UKAEA Risley Nuclear Power Development Establishment
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R;US)
Umweltbundesamt, Berlin (Germany, F.R.)
Air pollution by sulfur dioxide, 8:24240 (R;DE;In German)
UNC Nuclear Industries, Inc., Richland, WA (USA). Office of Surplus Facilities Management
Evaluation of nuclear-facility decommissioning projects, Enrico Fermi-1 reactor, 8:23530 (R;US)
Unified Industries, Inc., Springfield, VA (USA)
Assessment of state plans for Title III of the National Energy Conservation Policy Act (NECPA), 8:23706 (R;US)
Energy conservation in hospitals. Analysis of data for Maine and Ohio, 1978-1981, 8:23810 (R;US)
Energy conservation in Maryland public schools, 1978-1981, 8:23811 (R;US)
Energy conservation in Maryland public schools. Analysis of 1982 data in relation to the 1978-81 study, 8:23809 (R;US)
Identification of types of businesses with potential interest in operating and/or exporting ocean thermal energy conversion (OTEC) plants, 8:23760 (R;US)
Union Carbide Corp., Oak Ridge, TN (USA). Computer Sciences Div.
WHTM; Wisconsin hydrologic transport model, 8:24277 (R;US)
Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.
CHNSED; sediment & containment transport model, 8:24275 (R;US)
ODMOD; soil-water trace-containment transport, 8:24274 (R;US)
OPTRM; hydrologic transport with optimization, 8:24276 (R;US)
PROMSYS; programmed equipment maintenance, 8:24094 (R;US)
SPEKEN; Pearson, Spearman & Kendall correlation, 8:25241 (R;US)
TRUMP; transient & steady state temperature distribution, 8:24135 (R;US)
UOP/SDC, Joint Venture, McLean, VA (USA)
Handbook of gasifiers and gas-treatment systems, 8:22920 (R;US)
Uppsala Univ. (Sweden)
Optical properties of solids for solar energy conversion, 8:24006 (R;US)
Urban Systems, Inc., Oak Park, IL (USA)
Forecasts of intercity passenger demand and energy use through 2000, 8:23843 (R;US)
USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC. Office of Vehicle and Engine Research and Development
6th annual report to Congress for fiscal year 1982. Electric and Hybrid Vehicles Program, 8:23886 (R;US)
USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC
Transmisson-Facilities Vegetation-Management Program: Bonneville Power Administration. Draft environmental impact statement, 8:24309 (R;US)
USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Naval Petroleum and Oil Shale Reserves
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R;US)
USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Project and Facilities Management
Quarterly status of Department of Energy projects, 8:25231 (R;US)
USDOE Assistant Secretary for Nuclear Energy, Washington, DC. Office of Spent Fuel Management and Reprocessing Systems
US Department of Energy comments on the paper entitled "Bubble, bubble, toil and trouble: reprocessing nuclear spent fuel", 8:23112 (R;US)
USDOE Energy Information Administration, Washington, DC
Monthly Energy Review, 8:23755 (R;US)
Petroleum supply monthly, 8:23033 (R;US)
Petroleum supply monthly, 8:23034 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels
1981 Active-Solar-Installations Survey, 8:23758 (R;US)
Coal production: 1981, 8:23004 (R;US)
Cost and quality of fuels for electric utility plants, 8:23003 (R;US)
Cost and quality of fuels for electric utility plants, 8:23410 (R;US)
Cost and quality of fuels for electric utility plants, 8:23413 (R;US)
Cost and quality of fuels for electric utility plants, 8:23414 (R;US)
Cost and quality of fuels for electric utility plants, 8:23411 (R;US)
Cost and quality of fuels for electric utility plants, 8:23412 (R;US)
Electric power monthly, 8:23731 (R;US)
Electric power monthly, 8:23733 (R;US)
Electric power monthly, 8:23734 (R;US)
Electric power monthly, 8:23735 (R;US)
Electric power monthly, 8:23736 (R;US)
Electric power monthly, 8:23737 (R;US)
Electric power monthly, 8:23738 (R;US)
Electric Power Monthly, 8:23739 (R;US)
Electric power monthly, 8:23732 (R;US)
Projected costs of electricity from nuclear and coal-fired power plants. Volume 2, 8:23741 (R;US)
Prospects for future world coal trade, 8:23006 (R;US)
Quarterly coal report, July-September 1982, 8:23005 (R;US)
Typical electric bills. January 1, 1982, 8:23730 (R;US)
US-Canadian electricity trade, 8:23740 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use
Energy company development patterns in the postembargo era. An overview of financial performance, 1974-1980. Volume 1: analysis of trends, 8:23699 (R;US)
Monthly energy review, 8:23002 (R;US)
Residential energy consumption survey. Consumption patterns of household vehicles, supplement: January 1981-September 1981, 8:23756 (R;US)
Short-Term Energy Outlook. Volume 2. Methodology, 8:23713 (R;US)
Short-term energy outlook. Volume 2. Methodology, 8:23690 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas
Costs and indexes for domestic oil- and gas field equipment and production operations, 1982, 8:23017 (R;US)
Gas deliverability and flow capacity of surveillance gas fields in Texas, 8:23063 (R;US)

Gas supplies of interstate natural gas pipeline companies, 1981, 8:23048 (R;US)
Natural gas monthly, 8:23066 (R;US)
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications, 8:23013 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Statistical Standards
Directory of Energy Data Collection Forms, 8:23691 (R;US)
USDOE Morgantown Energy Technology Center, WV
Advanced environmental control technology , 8:22952 (R;US)
ASPEN; advanced system for process engineering, 8:22899 (R;US)
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R;US)
USDOE Office of Energy Research, Washington, DC. Energy Research Advisory Board
Energy conservation and the federal government: research, development, and management, 8:23707 (R;US)
USDOE Pittsburgh Energy Technology Center, PA
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R;US)
Comparative study of the combustion of alternate liquid fuels, 8:22994 (R;US)
Conductivity probe and data acquisition for a liquefaction cold model, 8:22926 (R;US)
Continuous haulage update, 8:22972 (R;US)
Engineering approaches to the development of hydraulic transport, 8:24107 (R;US)
Experimental evaluation of spray-dryer flue-gas desulfurization for use with Eastern US coals, 8:23428 (R;US)
Kinetics of anaerobic decomposition of phenol, 8:22949 (R;US)
Survey of coals treated by oxydesulfurization, 8:22992 (R;US)
Synthesis of liquids and pipeline gas by Fischer-Tropsch, 8:23221 (R;US)
Transportation fuels from indirect coal liquefaction, 8:22918 (R;US)
USDOE, Washington, DC
Addendum to Environmental Impact Statement. Operation of PUREX and Uranium Oxide Plant Facilities, 8:24308 (R;US)
Batteries for electric vehicles, 8:23885 (R;US)
Batteries for load leveling, 8:23408 (R;US)
Genetic effects of the decay of radionuclides in cells, 8:24396 (TG;US)
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R;US)
Utah State Univ., Logan (USA)
Action spectra for photosynthetic inhibition. Final report, 8:24373 (R;US)
Higher plant response to elevated ultraviolet irradiance. Final report, 8:24374 (R;US)
Protective mechanisms and acclimation to solar ultraviolet-b radiation in oenothera stricta. Final report, 8:24372 (R;US)
Ultraviolet radiation environment of pollen and its effect on pollen germination. Final report, 8:24371 (R;US)
Utah Univ., Salt Lake City (USA). Dept. of Materials Science and Engineering
Effects on processing conditions on the reliability of cross-linked polyethylene-cable insulation. Progress report, 8:24022 (R;US)
Utah Univ., Salt Lake City (USA). Earth Science Lab.
PLANMAP.REV1; plots geochemical data in plan, 8:23365 (R;US)
SECTION.REV1; plot geochemical drill hole data, 8:23379 (R;US)
Seismic baseline and induction studies: Roosevelt Hot Springs, Utah and Raft River, Idaho, 8:23370 (R;US)
SLUMB.REV0; one-dimensional Schlumberger inversion program, 8:23364 (R;US)

V

Vanderbilt Univ., Nashville, TN (USA). Dept. of Environmental and Water Resources Engineering
Search of the Russian scientific literature for the descriptions of the medical consequences of the Kyshtym accident, 8:23188 (R;US)
Varian Associates, Palo Alto, CA (USA). Palo Alto Microwave Tube Div.
60-GHz-gyrotron development program. Quarterly report No. 13, July-September 1982, 8:24836 (R;US)
Vereinigung Industrielle Kraftwirtschaft (VIK) e.V., Essen (Germany, F.R.)
Activity report 1981/82, 8:23718 (R;DE;In German)
Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Biology
Oil persistence in tundra and its impact on the below-ground ecosystem. Final report, 8:23039 (R;US)
Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Lab. for the Study of Environmental Degradation of Engineering Materials
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R;US)
Virginia Univ., Charlottesville (USA). Dept. of Physics
Magnetic impurities in superconductors. Progress report, August 1, 1982-June 30, 1983, 8:24745 (R;US)
VSE Corp., Alexandria, VA (USA)
OTEC support services. Quarterly technical progress report No. 19, November 15, 1982-February 14, 1983, 8:23308 (R;US)
VSE Corp., Oxnard, CA (USA)
Reliability engineering analysis - small-scale heat recovery incinerator installations (NS Mayport and NAS, Jacksonville). Final report, 8:23845 (R;US)

W

Washington State Univ., Pullman (USA)
Synthetic and catalytic studies directed toward homogeneously catalyzed selective oxidation. Final report, 8:24059 (R;US)
Waters (Mark) and Associates, Inc., Sunnyvale, CA (USA)
Gas-Turbine Evaluation (GATE) Computer Program: thermodynamic cycles, methods, and sample cases. Final report, 8:23417 (R;US)
Weizmann Inst. of Science, Rehovoth (Israel)
Successes and failures of the constituent quark model, 8:24605 (R;US)
Westinghouse Electric Corp., Forest Hills, PA (USA). Nuclear Technology Div.
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report, 8:23501 (R;US)
Thermal and hydraulic code verification: ATHOS2 and model boiler No. 2 data. Volume 3. Final report, 8:23503 (R;US)
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report, 8:23502 (R;US)
Westinghouse Electric Corp., Madison, PA (USA). Advanced Reactors Div.
Selection of low-risk design guidelines for energetic events, 8:23591 (R;US)
Westinghouse Electric Corp., Pittsburgh, PA (USA). Advanced Energy Systems Div.
Low-Cost Solar-Array Project: cell and module formation research area. Process research of non-CZ silicon material. Quarterly report No. 4, December 1, 1982-February 28, 1983, 8:23269 (R;US)
Westinghouse Electric Corp., Pittsburgh, PA (USA). Advanced Systems Technology Div.
Phase II: frequency domain analysis of low-frequency oscillations in large electric power systems. Volume 1. Basic concepts, mathematical models, and computing methods. Final report, 8:23434 (R;US)
Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center
Cleaning steam generators off-line (soaking) with chelants. Final report, 8:23497 (R;US)
Large-area sheet task: advanced dendritic-web-growth development. Annual report, October 23, 1981-October 22, 1982, 8:23267 (R;US)
Westinghouse Electric Corp., Waltz Mill, PA (USA). Advanced Reactors Div.
VARR2; CRBRP 2-dimensional transient fluid flow analysis, 8:23509 (R;US)

Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.
PHOS1; pH & conductivity of sodium phosphate solutions, 8:24055 (R;US)
SPAR1; shielding with analytic ray-tracing, 8:24719 (R;US)
Westinghouse Hanford Co., Richland, WA (USA)
PFR/TREAT CO1 and LO1 experiments, 8:23593 (R;US)
Wisconsin Univ., Madison (USA)
Important material considerations in INTOR, 8:24820 (R;US)
Organization of the R chromosome region in maize, 8:24328 (R;US)
Plasma potential in a magnetic mirror with electron-cyclotron-resonance heating, 8:24761 (R;US)
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R;US)
Study of the physical-chemical mechanisms and variables which affect the transport of inorganic and organic microcontaminants in heterogeneous systems. Technical progress report, 1 July 1980-1 July 1983, 8:24279 (R;US)
Utility Spot-Pricing Study: Wisconsin, 8:23748 (R;US)
Wisconsin Univ., Madison (USA). Dept. of Chemical Engineering
Flexibility and resiliency of process systems, 8:23029 (R;US)
General framework for the assessment of dynamic resilience. Part I. Theory, 8:24106 (R;US)
Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering
Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall, 8:24827 (R;US)
WTG Energy Systems, Inc., Buffalo, NY (USA)
Wind-resource monitoring at Southtowns Sewage Treatment Plant, Woodlawn, NY, 8:23389 (R;US)

X

Xerox Palo Alto Research Center, CA (USA)
Structural and electronic studies of defects in amorphous silicon. Report No. 3. Technical progress report, November 1981-January 1982, 8:23280 (R;US)

Y

Yale Univ., New Haven, CT (USA)
Polarized electron source for parity experiment at Bates, 8:24176 (R;US)

Z

Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)
High spins in gamma-soft nuclei, 8:24704 (R;US)
Zentralverband der Elektrotechnischen Industrie e.V. (ZVEI), Frankfurt am Main (Germany, F.R.)
Statistical report '82, 8:23749 (R;DE;In German)

PERSONAL AUTHOR INDEX

Authors' surnames are indexed in the form appearing in the abstracted publication; given names are reduced to initials. Each author entry gives the publication title and the citation number. The document type, e.g., R for Report; country of publication, e.g., US; and language of the document, e.g., In German; are given in parentheses at the end of the entry. If no language statement appears, the language is English. Tables of document types and country of publication codes appear after the indexes. For publications with multiple authors, an entry is provided for each author. Entries for the second and succeeding authors give references to the first author.

Because of problems involved in the mechanical preparation of this index, all accent marks are omitted. Changes in spelling introduced as a result of accent omission follow standard conventions.

A

Abbasi, H.A., Multi-fuel low-NO/sub x/ burner development, Phase II. Final report Mar 79-Feb 82, 8:24152 (R;US)

Abbey, D.S., *See* Kolstad, C.D., 8:23007

Abbott, D., Application of pyrolysis technology to the utilization of eastern Canadian coals, 8:22900 (R;CA)

Bibliography coal pyrolysis 1980-1981, 8:22910 (RA;CA)

Abbott, L.S., Workshop on cognitive modeling of nuclear-plant control-room operators, 8:23556 (R;US)

Abdo, S., *See* Fripiat, J.J., 8:23208

Abdollahian, D., *See* Healzer, J.M., 8:23612

Abdou, M.A., Important material considerations in INTOR, 8:24820 (R;US)

Key features of INTOR nuclear systems, 8:24819 (R;US)

Overview of INTOR nuclear systems, 8:24955 (J;US)

See Gohar, Y., 8:25175

See Jung, J., 8:24824, 8:24957

See Mattas, R.F., 8:25174

See Morgan, G.D., 8:24956

See Smith, D.L., 8:24823, 8:25173

Abe, M., Experimental study on feedback control system of plasma position, 8:25181 (J;US)

Abe, T., *See* Murakami, Y., 8:24908

See Obara, K., 8:25208

Abe, Y., *See* Hamada, Y., 8:24994

See Kawamura, T., 8:24851

Abercrombie, J.T., *See* Griffith, S.K., 8:23761

Abraham-Shrauner, B., Nonlinear theta-pinch equilibria, 8:24801 (J;GB)

Abrahams, P., *See* Thornton, I., 8:24474

Abrahams, S.C., *See* Liminga, R., 8:24040

Abramson, P.B., *See* Chung, K.S., 8:23601

See Kennedy, M.F., 8:23600

Abreu, K.E., *See* Smith, A.C. Jr., 8:24933

Aburomia, M.M., BWR refill-reflood program - TRAC-BWR component development, 8:23609 (R;US)

Adam, E., *See* Sanger, P.A., 8:25049

Adams, J.K., *See* Keller, C.E., 8:23040

Adams, L.M., *See* Ullrich, R.L., 8:24388

Adamski, K., *See* Lettau, H., 8:24199, 8:24200

Ades, M.J., LOCA analysis of annular fuel pellet design for extended burnup, 8:23606 (RA;US)

Adler, A., *See* Kagey, B.T., 8:24458

Adler, E.A., *See* Banos, A. Jr., 8:24848

Adler, H.I., Microbial mutagenesis and cell division, 8:24380 (RA;US)

Adler, R.J., *See* Mazarakis, M.G., 8:24169

See Miller, R.B., 8:24187

Adlon, G.L., *See* Dillow, C.F., 8:25219

Aerts, A.T., Three strange quark system, 8:24614 (RA;US)

Agarwal, Y.K., High-spin rotational states in ^{166}Hf and ^{170}W, 8:24689 (RA;DE;In German, English)

Agatsuma, K., *See* Shanfield, S.R., 8:24124

Aggus, L.R., Habitat suitability index models: regression models based on harvest of cool and coldwater fishes in reservoirs, 8:24398 (R;US)

Ahluwalia, R.K., *See* Im, K.H., 8:23770

Ahmad, I., *See* Khoo, T.L., 8:24681

Ahmed, H., *See* Carpenter, J., 8:24171

Aifantis, E.C., *See* Gerberich, W.W., 8:23929

See Unger, D.J., 8:23930

Aikawa, H., *See* Hosogane, N., 8:25179

Ainscough, J.B., Duplex fuel: British and Danish experience and evaluation, 8:23489 (RA;US)

Aisch, F.W., *See* Holzer, R., 8:23459

Aizawa, T., *See* Naito, T., 8:23199

Akaishi, K., *See* Kawamura, T., 8:24876

Akhtar, S., *See* Rogers, S., 8:22927

See Rogers, S.E., 8:22916

Aki, C.Z., *See* Guldmann, J.M., 8:23065

Akiba, M., *See* Kuriyama, M., 8:25110, 8:25110

See Tanaka, S., 8:25109

Akihama, R., *See* Ogasawara, T., 8:25041

Alam, J., *See* Kucuk, F., 8:23052

Alber, D., Lifetime measurements and quadrupole moments in sup(123,125)Xe, 8:24676 (RA;DE;In German)

Albert, K., Pilot working for the prevention of rock bumps in seam Wilhelm/Johann in Colliery Sachsen, 8:22968 (R;DE;In German)

Albertson, S.L., *See* Feng, W.W., 8:24033

Albrecht, C., *See* Krauth, H., 8:25055

Alcorn, J.S., *See* Turner, L.R., 8:25046

Aldrich, D.C., *See* Burke, R.P., 8:23574

Alesso, H.P., Preliminary investigation of interconnected systems interactions for the safety injection system of Indian Point-3, 8:23638 (R;US)

Alexander, M., *See* Chang, F.H., 8:24256

See Farber, P.S., 8:24402

Alexander, S.S., *See* Lambert, D.G., 8:24223

Ali, F., *See* Neufeld, R.D., 8:22925

Ali, S.A., *See* Walter, E., 8:24053

Alkezweeny, A.J., Visibility and the chemical composition of aerosols in air masses over Lake Michigan. Paper 81.21.5, 8:24254 (J;US)

Allard, B., Actinide sorption on rock minerals, 8:23146 (RA;DE)

Allen, G.C. Jr., *See* Knorovski, G.A., 8:23505

Allen, G.R., *See* Barrett, P.J., 8:24787

Allen, R.J., *See* Walton, L.A., 8:23488

Allison, D.P., *See* Niyogi, S.K., 8:24313

Allison, T.G., *See* McGoldrick, P.R., 8:25243

Alphin, J.G., *See* Payne, F.A., 8:23227

Alson, J., A brief summary of the technical feasibility, emissions, and fuel economy of pure methanol engines, 8:23237 (R;US)

Alter, H., *See* Cowking, C.B., 8:23590

Althaus, R., *See* Taylor, C., 8:24117

Altman, H., Status of the JET neutral injection system, 8:25108 (J;US)

Altmann, H., *See* De Vere, A.P.C., 8:25115

Alton, R.J., *See* Johnson, H.G., 8:25007

Altwicker, E.R., Wet and dry deposition into Adirondack watersheds, 8:24235 (RA;US)

Aly, A.E., *See* Hammad, F.H., 8:23921

Amano, M., *See* Westlake, D.G., 8:23997

Amin, S., *See* Huang, S., 8:24924

Ammerman, C.B., *See* Pearl, D.S., 8:24470

Ammerman, J.W., Dissolved cyclic adenosine monophosphate (cAMP) in the sea and uptake of cAMP by marine bacteria, 8:24351 (J;DE)

Amsler, K., *See* Cook, J.S., 8:24352

Andelfinger, C., *See* Buechl, K., 8:25119

Anderson, A.C., Kapitza thermal boundary resistance between two solids, 8:24746 (BA;US)

Anderson, D., Investment analysis in electricity supply. Staff working paper, 8:23422 (R;US)

Anderson, D.N., *See* Furman, E.R., 8:23415

Anderson, F., Technical specifications: McGuire Nuclear Station, Unit Nos. 1 and 2. Docket Nos. 50-369 and 50-370, 8:23529 (R;US)

Anderson, H.L., Neutron oscillations, 8:24619 (RA;US)

Anderson, J.L., Development of tritium technology for the United States Magnetic Fusion Energy Program and an update on the Tritium Systems Test Assembly, 8:24835 (RA;JP)

Development of tritium technology for the magnetic fusion energy program, 8:25129 (J;US)
Anderson, J.W., McDonnell 40-kW Giromill wind system: Phase I. Design and analysis. Volume I. Executive summary, 8:23395 (R;US)
Anderson, M.A., Study of the physical-chemical mechanisms and variables which affect the transport of inorganic and organic microcontaminants in heterogeneous systems. Technical progress report, 1 July 1980-1 July 1983, 8:24279 (R;US)
Anderson, N.E., Liquefaction of Cape Breton coals, 8:22908 (RA;CA)
Anderson, O.A., *See* Cooper, W.S., 8:25084
Anderson, R.T., Rack test and facility enhancement program, 8:23115 (R;US)
Anderson, T.C., *See* Funk, V.T., 8:23017
Anderson, V.C., *See* Spiess, F.N., 8:24156
Andersson, H.E.B., Sp-c12-301: thermal performances of solar energy absorbers, 8:23354 (R;US;SW)
Andersson, K., *See* Allard, B., 8:23146
Ando, T., Coil performance test of nb/sub 3/sn conductor to be used in the advanced cluster test facility, 8:25018 (J;US)
See Miyata, H., 8:24999, 8:25000
See Ohkubo, M., 8:25001
See Shimamoto, S., 8:25053, 8:25056
Ando, Y., Prediction of mass excess, β-decay energy and neutron separation energy from the atomic mass formula with empirical shell terms, 8:24643 (R;JP)
Andrews, M.G., Operating experience with combustion engineering fuel at high burnups, 8:23474 (RA;US)
Angel, E.S., High-speed maximum-entropy encoder for images, 8:25276 (R;US)
Angelino, G., Heat recovery by organic Rankine cycle in ceramics firing ovens. Final report, 8:23865 (R;US)
Angelis, A.L.S., High p/sub T/ π^0 production with $\alpha\alpha$ and αp beams at the CERN ISR, 8:24577 (R;US)
Antonini, M., *See* Lanza, F., 8:24004
Antreasyan, D., Production mechanisms of high mass muon pairs. Technical report number 117, 8:24576 (R;US)
Appel, J., *See* Knowles, T.R., 8:23954
April, G.C., *See* Hansen, S.M., 8:23263
April, R.H., Mineralogy of the ILWAS lake-watering, 8:24499 (RA;US)
Aquino, J.T., *See* Notis, C., 8:23394
Argon, A.S., Micromechanical modeling of microstructural damage in creeping alloys. Progress report, March 1, 1982-February 28, 1983, 8:23950 (R;US)
Arko, A.J., Phase transitions in high magnetic fields, 8:23888 (R;US)
Armentrout, C.J., *See* Mahdavi, M.A., 8:24865
Armijo, J.S., *See* Davies, J.H., 8:23460
Armitage, W.J., *See* Mazur, P., 8:24397
Armor, A., *See* Dau, G.J., 8:23464
Armstrong, W.T., *See* Sgro, A.G., 8:24792
Arndt, P., Operation of VICKSI, 8:24161 (RA;DE;In German)
Arney, B., *See* Broxton, D., 8:24485
Arnold, J., Gas supplies of interstate natural gas pipeline companies, 1981, 8:23048 (R;US)
Arnold, J.B., Method for producing highly reflective metal surfaces, 8:23976 (P;US)
Aronson, E.A., *See* Wyant, F.J., 8:23550
Arthur, A., EMI measurements of lighting systems, 8:23824 (RA;US)
Arthur, E.D., *See* Young, P.G., 8:24671
Arumi-Noe, F., Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982, 8:23804 (R;US)
Outline of a ventilation computer model for possible incorporation into DEROB, 8:23808 (RA;US)
Preliminary daylighting studies for incorporation into DEROB, 8:23807 (RA;US)
Theory of the geometric algorithm of the DEROB program, 8:23806 (RA;US)
Thermal network solution of the DEROB program, 8:23805 (RA;US)
Arunasalam, V., Some novel features of the ordinary-mode electron-cyclotron resonance heating of tokamak plasmas, 8:24771 (R;US)
Asay, J.R., *See* Brannon, P.J., 8:24007
Asbury, J.G., Assessment of cool storage in commercial building applications, 8:23664 (R;US)
Case for electricity: an applications approach, 8:23728 (R;US)
Economics of cool storage for electric load leveling, 8:23426 (J;US)
Ash, J.E., Core restraint analysis of a free-flowering large heterogeneous LMFBR, 8:23644 (J;US)
Fluid-cushioned impact between reactor fuel assemblies for seismic disturbances, 8:23643 (J;US)
Ashby, D.E.T., Thermal stability of peripheral plasmas, 8:24795 (J;NL)
Ashcroft, D.L., *See* Nudelman, A., 8:25073
Ashley, T., Meiotic studies of rearrangements by synaptonemal complex analysis, 8:24337 (RA;US)
Ashok, S., Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys, 8:23916 (RA;US)
Ashraf, F.A., *See* Cooke, N.E., 8:22934
Ashworth, C.P., *See* Smith, A.C. Jr., 8:24933
Aspen Project Staff, T., ASPEN; advanced system for process engineering, 8:22899 (R;US)
Atabek, R., High burnup effects on the pellet-cladding interaction phenomenon, 8:23484 (RA;US)
See Bruet, M., 8:23486
See Kauffmann, Y., 8:23482
Atcheson, D.B., BEHAVE-SST; overpower transient fuel mechanics, 8:23512 (R;US)
Atlas, R.M., *See* Linkins, A.E., 8:23039
Attalla, A., *See* Bowman, R.C. Jr., 8:24010
Attenberger, S.E., *See* Hively, L.M., 8:24814
Atwood, C.L., Common-cause fault rates for instrumentation and control assemblies, 8:23631 (R;US)
Atwood, W., *See* Antreasyan, D., 8:24576
Atwood, W.B., *See* Mestayer, M.D., 8:24602
Au, W.W., *See* Preston, R.J., 8:24376
Auciello, O., Electron assisted methane production on carbon surfaces, 8:25163 (J;US)
Audenaerde, K., *See* Beyer, J.B., 8:25098
Auerbach, L.B., *See* Highland, V.L., 8:24583
Aureille, M., Geothermal heating, 8:23385 (R;US)
Aust, K.T., *See* Thorpe, S.J., 8:23910
Austin, J.C., *See* Little, N.E., 8:23387
Avery, R., Status of fast-breeder-reactor safety, 8:23602 (R;US)
Aviv, A., *See* Bogden, J.D., 8:24345
Axelrod, T.S., *See* Woosley, S.E., 8:24507
Axtmayer, R.W., *See* Sasscer, D.S., 8:23310
Ayers, J.W., Design and fabrication considerations for normal copper pf coils located inside tf coils to facilitate replacement, 8:24918 (J;US)
Aymar, R., Design and mechanical analysis of TORE SUPRA vacuum vessels and limiters, 8:25207 (J;US)
Ayrault, G., *See* Wang, Z., 8:23931
Azam, F., Multiphasic kinetics for D-glucose uptake by assemblages of natural marine bacteria, 8:24273 (J;DE)
See Ammerman, J.W., 8:24351

B

Baade, P., EIA symposium on short-term energy forecasting. Summary of the proceedings, 8:23721 (R;US)
Baake, M., Relations between irreducible representations of the hyperoctahedral group and O(4) and SO(4), 8:24630 (R;DE)
Babcock, L.M., Dynamics of association and decay. A model study of $Cl^- + Cl_2$ arrow-right-left Cl/sup - asterisk/$_2$ using quasiclassical trajectories, 8:24062 (J;US)
Baca, A.G., *See* Tobin, J.G., 8:23981
Bachman, A.L., Self-help energy conservation programs for low-income groups: the SMILE experience, 8:23826 (R;US)
Bader, A., Target laboratory, 8:24177 (RA;DE;In German)
Badot, J., *See* Heikhaus, H.H., 8:23322
Badruzzaman, A., *See* Newman, L.W., 8:23492
Baer, D.R., *See* Bruemmer, S.M., 8:23898
Baes, C.F., SULCAL; model of sulfur chemistry in a plume, 8:24228 (R;US)
Baetsle, L.H., *See* Vandenborre, H., 8:23206
Baeumler, J., *See* Staebler, A., 8:25082
Bagnal, C., *See* Harris, R., 8:23493
Baier, H., *See* Bader, A., 8:24177
Bailey, A.W., Theoretical model for hot plasma flowing to a wall with recycling, 8:24870 (J;NL)
Bailey, J., *See* Carpenter, J., 8:24171
Bailey, R.E., *See* Hackley, D.S., 8:25045
Bailiff, E.G., *See* Popp, R.A., 8:24379
Baily, W.E., *See* Baumgartner, J.A., 8:23449
Bain, G.M., *See* Coleman, T.A., 8:23476
Bairiot, H., High burnup performance of BN fuels in LWR's, 8:23453 (RA;US)
Baker, C.C., *See* Evans, K. Jr., 8:24951
See Herman, H., 8:24969
Baker, G.A. Jr., Analysis of the lattice, strong coupling series for g$_0$phi^4 field

theory in d dimensions, 8:24634 (J;NL)
Hard-core square-well fermions, 8:24756 (J;US)
Baker, J.E., Modeling industrial-boiler retirement economics, 8:23696 (R;US)
Baker, P.C., *See* Wallerstein, E.P., 8:25142
Baker, W., Buckling investigation of ring-stiffened cylindrical shells with reinforced openings under unsymmetrical axial loads, 8:23551 (R;US)
Balasubramanian, K., Symmetry simplifications of space types in configuration interaction induced by orbital degeneracy, 8:24563 (J;US)
Baldo, P., *See* Fowler, T.B., 8:23993
Baldwin, R.D., *See* Braid, T.H., 8:23587
Balgovind, R., *See* Ghil, M., 8:25251
Ball, J., *See* Carpenter, J., 8:24171
Ballantine, D.L., *See* Sasscer, D.S., 8:23310
Ballard, J.H., *See* Wehrenberg, J.P., 8:23014
Ballou, J.K., Design and testing of a dual 8-T 380-mm/12-T 220-mm split superconducting solenoid for ORNL, 8:24125 (J;US)
See Gray, W.H., 8:25017
Ballou, S.W., *See* Veselka, T., 8:24400
Balluffi, R.W., *See* Brokman, A., 8:23951
Balogh, L.A., *See* Kenney, F.T., 8:24449
Baltay, C., *See* Angelis, A.L.S., 8:24577
Bamford, W.H., *See* Murty, K.L., 8:23919
Bandy, J.A., *See* Generoso, W.M., 8:24384, 8:24430
Bangham, J.W., *See* Russell, L.B., 8:24335
See Russell, W.L., 8:24424
Banning, D., *See* Galloway, J.N., 8:24286
Banos, A. Jr., Magnetohydrodynamic stability of magnetic slabs, 8:24848 (J;US)
Bansal, N.K., Plastic solar air heaters of a novel design, 8:23352 (R;DE)
Barak, G., Orbital stability of the high-current betatron, 8:24190 (J;US)
Barber, A., *See* Souder, P., 8:24176
Barber, J.P., Repetitive switching for inductive energy storage. Final technical report Apr 81-Jun 82, 8:23661 (R;US)
Barber, L.B. II, Variability of mercury concentrations of midcontinent soils, USA; baseline data for a coal-fired power plant, 8:24259 (J;US)
Barbour, R.L., *See* Henry, W.M., 8:24051
Barker, J.R., *See* Presser, N., 8:24547
Barker, L.M., SWAP9; stress-wave analysis in 1-dimensional strain, 8:24092 (R;US)
Barna, B.A., *See* Johnson, J.A., 8:24141
Barna, E.A., *See* Rienecker, F. Jr., 8:25149
Barnes, H.H., *See* McCarthy, P.M., 8:23693, 8:23719
Barnes, P.D., Λ and Σ hypernuclear physics, 8:24594 (RA;US)
Barnes, S., *See* Buelt, J., 8:23164
Barnett, R.M., Nature of nonperturbative effects in lepton-nucleon scattering, 8:24624 (J;US)
Barnett, T.P., Possible changes in global sea level and their potential causes, 8:24269 (R;US)
Baron, D., *See* Bruet, M., 8:23486
Baron, M., *See* Kauffmann, Y., 8:23482
Baron, S., Framework for modeling supervisory control behavior of operators of nuclear power plants, 8:23558 (RA;US)
Barraclough, B.L., Method and apparatus for recovering unstable cores, 8:23020 (P;US)
Barrault, M.R., *See* Sethuraman, S.K., 8:24885
Barrett, M.F., *See* Ponton, J., 8:24361
Barrett, P.J., Measurement of growth rate of plasma drift wave excited by slow electrons, 8:24787 (J;US)
Barry, K., Conceptual plant design for a commerical EBT reactor, 8:24930 (J;US)
Bart, S., *See* Hungerford, E.V., 8:24595
Barth, H.J., 4f instabilities of isolated Ce ions in elements, 8:23966 (RA;DE;In German, English)
Local 4f moment studies by TDPAD, 8:24740 (RA;DE;In German, English)
See Luszik-Bhadra, M., 8:23967
Barth, R.C., Soil-depth requirements to reclaim surface-mined areas in the northern Great Plains. Open file report 29 Jul 76-8 Apr 82, 8:22965 (R;US)
Bartlett, J.C., Thermal performance of space-cooling solar-energy systems in the National Solar Data Network, 8:23328 (R;US)
Bartlit, J.R., Developments in the fuel cleanup system for the tritium system test assembly, 8:25130 (J;US)
Basini, G., *See* Angelis, A.L.S., 8:24577
Baskes, M.I., Tritium permeation in fusion reactor first walls, 8:24901 (J;NL)
Batchelor, D.B., *See* Kritz, A.H., 8:24767
Bateman, G., Ripple reduction poloidal field coils for tokamak fusion reactors, 8:24987 (J;US)
Bates, J.B., *See* Bjerre, N., 8:24061
Bates, R.C., *See* Mitra, S., 8:24310
Bathke, C.G., *See* Lieurance, D.W., 8:25012
See Zuckerman, D.S., 8:24929
Batist, R. de, *See* Iseghem, P. van, 8:23141
Battles, D.D., *See* Gitman, G.M., 8:24154
Battles, J.E., Method for uniformly distributing carbon flakes in a positive electrode, the electrode made thereby and compositions, 8:23683 (P;US)
Baublitz, J.E., Overview of United States tritium programs, 8:24833 (RA;JP)
Bauder, U.H., *See* Fang, D.Y., 8:24886
Bauer, E.R. Jr., *See* Demski, R.J., 8:22953
Bauer, F., *See* Hoffmann, H., 8:23532
Bauer, T.H., Analyses with the FSTATE code: fuel performance in destructive in-pile experiments, 8:23588 (R;US)
Role of fuel power in HCDA early fuel dispersal, 8:23650 (J;US)
Bauer, W., *See* Baskes, M.I., 8:24901
Bauhof, F., *See* Gates, R., 8:23151
See Roberds, W., 8:23153, 8:23154
Baum, D.W., High power pulsed plasma MHD experiments. Annual report 1 Jan 81-30 Sep 82, 8:23763 (R;US)
Bauman, D.S., Analysis of power-plant-construction lead times. Volume 1. Analysis and results, 8:23419 (R;US)
Baumgartner, J.A., Extended burnup fuel investigations in commercial reactors, 8:23449 (RA;US)
Baur, J.F., Hardening of instruments for fusion reactors, 8:24810 (J;US)
Baxter, D.E., *See* Braid, T.H., 8:23587
Baxter, H.H. Jr., Intermediate photovoltaic system application experiment operational performance report. Volume 14. For Beverly High School, Beverly, Massachusetts for October 1982, 8:23293 (R;US)
Baymen, B., *See* Lin, Q.K.K., 8:24645, 8:24652
Bayne, C.K., QDF misclassification probabilities for known population parameters, 8:25281 (J;US)
Beal, J.W., *See* Nerem, A., 8:25090
Bean, S.D., User's Manual for the TVA Lumber Yield and Value File Utility Program. Version 1.0, 8:24356 (R;US)
Bearse, R.C., *See* Malanify, J.J., 8:23198
Beasley, C.O. Jr., Universal mode with diffusive electrons: linear instability and nonlinear saturation, 8:24780 (J;US)
Beaujean, R., *See* Sermund, G., 8:24201
Beck, F., Development of a lead tetrafluoroborate accumulator, 8:23670 (R;DE;In German)
Beck, H.P., Investigation of the interaction between the power electronic circuit and power supply systems, 8:23431 (R;DE;In German)
Beck, J., *See* Vahl, M., 8:24257
Beck, K.G., Recent developments in blast furnace coke production, 8:22933 (R;MX)
Beck, P., *See* Schaerer, B., 8:24240
Beck, R., Calculating matrix elements of slater determinant wave functions in the cluster model. Pt. 2, 8:24715 (R;DE)
Becker, G., *See* Engelhardt, W., 8:24863
Becker, H., *See* Bobrov, E.S., 8:25005
Becker, P.N., *See* Revis, N., 8:24447
Becker, U., *See* Antreasyan, D., 8:24576
Beckman, R.J., *See* Crowe, B.M., 8:23189
Bedinger, A.F.G., Correlation of FCHART 4.0 with solar/heat-pump systems, 8:23317 (R;US)
Beebe, G.W., *See* McGregor, D.H., 8:24357
Beech, J.F., *See* Trautmann, C.H., 8:23437
Beedlow, P.A., Design surface covers: an approach to long-term waste site stabilization, 8:23172 (R;US)
Beers, C.J., *See* Arko, A.J., 8:23888
Beezhold, W., *See* Sanford, T.W.L., 8:24729
Begovich, C.L., *See* Larson, N.M., 8:25255
Behrens, H., *See* Klotz, D., 8:24263
Behringer, K., *See* Engelhardt, W., 8:24863
Behrisch, R., *See* Fang, D.Y., 8:24886
Behroozi, F., Observation of a first-order phase transition in single-crystal $ErRh_4B_4$ at H/sub c2/, 8:24002 (R;US)
Bein, B.K., Derivation of the power deposition on limiters and divertor targets from time and space resolved thermographical measurements, 8:24892 (J;NL)
Bein, J.D., *See* Wilson, H.W., 8:23475
Beitz, J.V., *See* Carnall, W.T., 8:24078
Bekink, J., *See* Giesen, B., 8:25063
Belanger, R., *See* Furimsky, E., 8:22906
Bell, C. R., System study on the possibilities of intensified use of solar energy in the Federal Republic of Germany (FRG), 8:23312 (R;DE;In German)
Bell, H.H. Jr., Diagnostic timing system for the TMX-Upgrade, 8:25170 (J;US)
Bell, M., *See* Fonck, R.J., 8:24864

Bellas, G.T., *See* Pan, Y.S., 8:22998
Bellinger, F.O., *See* Cole, R.L., 8:23356
Bellissent, R., Small angle neutron scattering study of structural heterogeneities in -Si:H, 8:23261 (R;FR)
Bellomo, P., Plasma striking voltage production, 8:25075 (J;US)
Belsky, M., *See* Kuehn, L., 8:22944
Bender, C.M., Finite element approximation in quantum field theory, 8:24633 (J;NL)
Bendersky, C., *See* Hirshfeld, D.S., 8:23035
Benedek, R., *See* King, W.E., 8:23934, 8:23935
Benedict, B.L., *See* Rogers, A.G., 8:24958
Benjamin, R., *See* Taylor, D.B., 8:23815
Benkovitz, C., *See* Shannon, J.D., 8:24231
Bennett, G.A., Analysis and thermal-design improvements of downhole tools for use in hot-dry wells, 8:23372 (R;US)
Bennett, J., *See* Baker, W., 8:23551
Bennon, R.J., *See* Byerly, R.T., 8:23434
Benofy, L.P., *See* Baker, G.A. Jr., 8:24634, 8:24756
Benson, C.M., *See* Kaplan, S.I., 8:23296
Bentley, D.E., *See* Exarhos, C.A., 8:23477
Bentsen, L.D., Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA;US)
Berbigier, L.W., *See* Gritton, D.G., 8:25150
Berde, D., Digitally controlled twelve-pulse firing generator, 8:25187 (J;US)
Berg, D., *See* Jensen, T., 8:24623
Berger, A., Quadrupole moment of the 7^- isomer in ^{143}Sm, 8:24677 (RA;DE;In German)
Berger, M.H., Green's function for Onsager's pancake equation, 8:23103 (R;US)
Berglund, L.G., *See* Leaderer, B.P., 8:23831
Bergmeister, F.J., ^{43}K, a new probe for the system KFe, 8:24665 (RA;DE;In German)
Berhringer, K., *See* Vernickel, H., 8:24859
Berk, J.V., Impact of energy-conserv retrofits on indoor air quality in residential housing. Paper 81.22.1, 8:23832 (J;US)
Berkey, J.H., *See* Yugo, J.J., 8:24776
Berko, S., *See* Chakraborty, B., 8:23939
See Fluss, M.J., 8:23942
Berkowitz, C., *See* Shannon, J.D., 8:24231
Berkowitz, C.M., *See* Alkezweeny, A.J., 8:24254
Berman, S.M., *See* Verderber, R.R., 8:23819
Bernabei, S., *See* Stevens, J.E., 8:24766
Bernard, M.J., *See* Giese, R.F., 8:23729
Bernstein, I.B., Alfven wave heating in general toroidal plasmas, 8:24784 (J;US)
See Hazak, G., 8:24781
Bernstine, E.G., *See* Russell, L.B., 8:24332
Berry, G., Performance advantages of a gas-stream MHD retrofit, 8:23772 (R;US)
See Im, K.H., 8:23770
Berry, G.F., Application of polyalgorithmic optimization to MHD power plant design, 8:23771 (R;US)
See Geyer, H.K., 8:23769
Berry, H.G., Beam-foil spectroscopy at Argonne National Laboratory, 8:24517 (R;US)
Optical observations of molecular dissociation in thin foils, 8:24514 (R;US)
See Brooks, R.L., 8:24518
Berry, L.A., *See* Hillis, D.L., 8:24790
Berry, R.S., Topics in finite time thermodynamics, 8:24158 (R;US)
Berry, S., Investigation of the asymmetry of the charge transfer into continuum in collisions of 155 MeV Ne^{10+} in He, 8:24539 (RA;DE;In German)
Bertozzi, W., *See* Souder, P., 8:24176
Bertram, H.P., *See* Zumkley, H., 8:24462
Bertschat, H.H., Hyperfine fields at ^{19}F in nickel in the critical region, 8:23958 (RA;DE;In German)
Local susceptibility of ^{62}Ni in palladium, 8:23960 (RA;DE;In German)
Temperature dependence of the EFG of ^{202}Tl in thallium metal, 8:23957 (RA;DE;In German)
Besen, P.D., High speed digital data acquisition system on Alcator, 8:25193 (J;US)
Bethge, K., *See* Gruber, G., 8:24543
Bevolo, A.J., *See* Kester, J.J., 8:23987
Beyer, C.E., Evaluation of published high burnup fission gas release data, 8:23456 (RA;US)
Beyer, J.B., Beam waveguide launcher for high power ecrh heating in large tandem mirror machines, 8:25098 (J;US)
Beyerlein, A.L., *See* Geldard, J.F., 8:23111
Bezzon, G., *See* Rossi-Alvarez, C., 8:24145
Bhamathi, G., Supernuclei, supernuclear matter & SU(4) symmetry, 8:24616 (RA;US)
Bhattacharyya, A., *See* Mitra, S., 8:24310
Bhattacharyya, S.K., *See* Rudolph, R.R., 8:23570
Bice, A.N., ^{13}C and ^{9}Be production in $^{12}C+^{208}Pb$ collisions, 8:24701 (J;NL)
Bienstock, D., *See* Ekmann, J.M., 8:22994
Biffle, J.H., *See* Leisher, W.B., 8:24112
Biggs, J., *See* Praeg, W.F., 8:24970
Bilikmen, S., *See* Willett, J.E., 8:24808
Billen, D., Genetics of repair of radiation damage to DNA in bacteria, 8:24381 (RA;US)
Bingham, G.E., *See* Coyne, P.I., 8:24455
Birattari, C., Comparison between LYRA and SAND code performance for the extrapolation of data from activation detectors used for determining spectra of acceleration neutrons, 8:24203 (R;IT)
Birchfield, E.B., *See* Anderson, J.W., 8:23395
Birchler, J.A., *See* Jacobson, K.B., 8:24412
Bird, R.E., Extensive modeled terrestrial solar spectral data sets with solar-cell analysis, 8:23281 (R;US)
Bird, S.K., *See* Krupa, J.F., 8:24249
Birkelund, J.R., Fission fragment angular correlation in 300 MeV ^{20}Ne induced reactions on heavy targets, 8:24686 (RA;DE;In German, English)
See Wilcke, W.W., 8:24685
Birnbreier, H., Latent heat storage for solar energy systems, 8:23357 (R;XE;GE)
Bishop, A.R., *See* Campbell, D.K., 8:24024
Bissell, R.R., *See* Little, N.E., 8:23387
Bitter, M., *See* Stevens, J.E., 8:24766
Biver, C.J., SYSREL; reliability analysis of series systems, 8:25257 (R;US)
Bivin, W.M., *See* Aggus, L.R., 8:24398
Bivins, R.L., *See* Kolstad, C.D., 8:23007
Bjerre, N., Charge transfer complexes of molecular oxygen in $NaClO_3$ and $KClO_3$ studied by resonance Raman and infrared spectroscopy, 8:24061 (J;US)
Bjorken, J.D., Highly relativistic nucleus-nucleus collisions: The central rapidity region, 8:24626 (J;US)
Blachere, J.R., High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R;US)
Blackwell, B.F., Quasi-steady model for predicting temperature of aqueous foams circulating in geothermal wellbores, 8:23382 (R;US)
Blair, C.K., Development of an instrument to measure the concentration of noncondensable gases in geothermal discharges. Final report, October 1, 1978-September 30, 1979, 8:23373 (R;US)
Blair, D.G., *See* Vande Woude, G.F., 8:24338
Blair, T.R., *See* Exarhos, C.A., 8:23477
Blais, N.C., Quasiclassical trajectory (and variational transition state theory) study of the rates and temperature-dependent activation energies of the reactions $Mu+H_2$ (completely thermal) and H, D, and $Mu+H_2$ ($v = 0$, $j = 2$), 8:24079 (J;US)
Third body efficiencies for collision-induced dissociation of diatomics. Rate coefficients for $H+H_2 \rightarrow 3H$, 8:24550 (J;US)
Blake, J.C., GCFM5.0; geothermal field & power plant costs, 8:23378 (R;US)
Blanchard, R., The Eastern Environmental Radiation Facility's participation in interlaboratory and intralaboratory comparisons of environmental sample analyses: 1979 and 1980. Final report, 8:24265 (R;US)
Blanchard, W.R., *See* Dylla, H.F., 8:24769
Blau, F.P., *See* Mahdavi, M.A., 8:24865
Blazeck, T., *See* Hannon, B., 8:23037
Blewer, R.S., *See* Whitley, J.B., 8:24910
Bliss, E.S., Nova alignment and laser diagnostics systems - 1, 8:25146 (J;US)
Nova alignment and laser diagnostics systems - 2, 8:25147 (J;US)
Bloom, E.D., *See* Mestayer, M.D., 8:24602
Bloom, M.H., Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R;US)
Bluhm, D.D., Selective magnetic enhancement of pyrite in coal by dielectric heating, 8:22991 (R;US)
Bobrov, E.S., Model of toroidal magnet systems as orthotropic shells of finite thickness, 8:24991 (J;US)
Structural behavior of the Bitter plate tf magnet for the Zephyr ignition test reactor, 8:25005 (J;US)
Bodvarsson, G., *See* Wade, J.E., 8:23388
Boehm, H., Development of a crude gas/air fuel cell system, 8:23783 (R;DE;In German)

Boehm, L., *See* Susman, S., 8:24029
Boesch, D.F., Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, 8:24267 (R;US)
Boettcher, A., *See* Bansal, N.K., 8:23352
Bogden, J.D., Release of zinc from disposable coils during hemodialysis, 8:24345 (J;US)
Bogensberger, H.G., Limiter, of dense and high thermal conducting material, for a fusion reactor, 8:25159 (J;US)
Bogomolni, R.A., Microwave absorption studies of interface phenomena at ZnO electrodes, 8:24074 (J;US)
Bohlen, G., *See* Egelhaaf, C., 8:24653
Bohlen, H.G., Energy dependence of the total reaction cross section of the system $^{12}C + ^{12}C$, 8:24648 (RA;DE;In German)
Excitation of the giant quadrupole resonance in ^{58}Ni by 40 MeV ^{20}Ne, 8:24657 (RA;DE;In German)
Observation of the nuclear rainbow scattering in the $^{12}C + ^{12}C$ system at 300 MeV, 8:24647 (RA;DE;In German)
See Flynn, E.R., 8:24658
See Froebrich, P., 8:24667
See Kovar, D.G., 8:24659
See Lettau, H., 8:24199, 8:24649
See Machner, H., 8:24700
See von Oertzen, W., 8:24674, 8:24692
Bohn, F.H., Experience from the implementation of a control-and data acquisition system for the tokamak TEXTOR, 8:25176 (J;US)
Bohn, H., Spectroscopy of neutron-rich nuclei via particle-γ-coincidences with a magnetic spectrograph, 8:24202 (RA;DE;In German)
Bohne, W., Charge equilibration in the deep-inelastic reactions $^{40}Ar + ^{100}Mo$ and $^{36}Ar + ^{92}Mo$, 8:24675 (RA;DE;In German)
Complete fusion in the system $^{146}Nd + ^{16}O$ at 10 MeV/N, 8:24687 (RA;DE;In German)
Measurement of evaporation residues from the system $^{40}Ar + ^{40}Ca$, 8:24663 (RA;DE;In German, English)
See Kovar, D.G., 8:24661
See Lehr, H., 8:24668
See Morgenstern, H., 8:24662
Bohr, A.H., Design of a 9 inch stub tuner for PLT icrh operation, 8:25096 (J;US)
For the PDX CO/sub 2/ laser experiment. Optical mounts and shutter-window-grating system design, 8:24815 (J;US)
Bol, K., *See* Fonck, R.J., 8:24864
Boling, M.E., *See* Volkin, E., 8:24315
Boliver, S.L., *See* Hardy, L.C., 8:23099
Bomse, D.S., *See* Valentini, J.J., 8:24558
Bonde-Nielsen, K., *See* Bertschat, H.H., 8:23958
Bonnal, J.F., Development, fabrication and tests of the periplasmatron ion sources for ASDEX, 8:25088 (J;US)
Bonnewell, V., *See* Skinner, D.M., 8:24317
Boone, L.R., *See* Yang, W.K., 8:24387
Boozer, A.H., Time-dependent drift Hamiltonian, 8:24772 (R;US)
Bordner, G.L., *See* Wider, H.U., 8:23592
Bormann, R., Development of dry-filter dust extractors to reduce dust development during operation of heading machines, 8:24229 (R;DE;In German)
Borrass, K., Normal conducting steady-state toroidal magnet systems for large tokamaks, 8:24997 (J;US)
Borresen, B.A., Thermal room models for control analysis, 8:23835 (J;US)
Borys, S.S., *See* Cowking, C.B., 8:23590
Bosch, R., Foster Wheeler protected bayonet-tube steam-generator conceptual designs, 8:23518 (R;US)
Boschear, W., SKILLS INVENTORY; personnel information system, 8:25224 (R;US)
Bott, T.F., An assessment of SIMMER-11 freezing, melting, and plugging calculations, 8:23646 (J;US)
Bottger, A., Atmospheric cycles of nitrogen oxides and ammonia, 8:24239 (R;US)
Bottiglioni, F., *See* De Vere, A.P.C., 8:25115
Boucher, C., Impurity control in the Varennes tokamak, 8:24862 (J;NL)
Bougard, J., Optimization of heat storage systems using silica gels. Final report, 8:23665 (R;US)
Bourcier, D.R., Cadmium-copper interaction: tissue accumulation and subcellular distribution of cadmium in mice after simultaneous administration of cadmium and copper, 8:24471 (J;US)
Bourque, R.F., OHTE reactor concepts, 8:24931 (J;US)
Bourrasse, A., Kinetic aspects of the n-GaAs/(S/Se)sub(n)sup(2-) photoelectrochemical cell, 8:23262 (R;FR)
Bouwknegt, K., *See* Lisser, J., 8:25062
Bowen, N., 60 GHz ecrh system for the PPL PDX machine, 8:25123 (J;US)
Bowers, D., *See* Mattas, R.F., 8:25174
See Smith, D.L., 8:24823
Bowers, D.A., *See* Hellwig, T.M., 8:24923
See Morgan, G.D., 8:24956, 8:25210
Bowersox, V.C., Seasonal patterns of sulfate and nitrate in precipitation in the United States. Paper 81.6.1, 8:24226 (J;US)
Bowles, N.D., *See* Ullrich, R.L., 8:24388
Bowman, C.D., Measurements of inelastic scattering of eV neutrons. Final report, 8:24728 (R;US)
Bowman, H.R., *See* Klainer, S.M., 8:24294
Bowman, J.D., Proceedings of the workshop on nuclear and particle physics at energies up to 31 GeV: new and future aspects, 8:24578 (R;US)
Bowman, R.C. Jr., NMR study of phase transitions in VT/sub 0.50/ and VT/sub 0.75/, 8:24010 (J;US)
Boyd, D.A., *See* Winske, D., 8:24785
Boyd, D.W., Commercialization analysis of large wind energy conversion systems. Final report, 8:23390 (R;US)
Boyd, R.D., *See* Bliss, E.S., 8:25146, 8:25147
Boyle, J.R., Use of oscillograph records for analyzing system performance, 8:23440 (R;US)
Brabers, M., *See* Casteels, F., 8:23145
Bracker, G.P., Fuel of MSW, 8:23217 (R;DE;In German)
Bradley, G., *See* Hurley, C.A., 8:25141
Brager, H.R., Microstructural and microchemical comparisons of AISI 316 irradiated in HFIR and EBR-II, 8:23955 (R;US)
Braginski, A.I., Workshop on superconducting for magnets: frontiers of technology, 8:24128 (J;US)
Braid, T.H., DN detection during SLSF tests, 8:23587 (R;US)
Bramson, G., *See* Mahdavi, M.A., 8:24865
Brandt, R., *See* Ingold, G., 8:24198
Brannon, P.J., Spectral and spatial studies of shock-induced luminescence from quartz, 8:24007 (R;US)
Branscomb, D., *See* Scott, J.T., 8:25245
Branton, D., Studies of membrane structure by freeze-etching. Final report, January 1, 1979-December 31, 1982, 8:24325 (R;US)
Braslawsky, G.R., *See* Kennel, S.J., 8:24321
See Mullaney, P.F., 8:24450
Brattsten, L.B., *See* Witschi, H.R., 8:24442
Brau, K., *See* Fonck, R.J., 8:24864
Braun, R., 20 kW fuel cell units of compact assembly. Pt. 6, 7, 8:23789 (R;DE;In German)
Braunsberger, U., Magnetizing circuit of TEXTOR, 8:25029 (J;US)
Bray, D.J., Thermal/strain history effects on creep of refractory concrete, 8:22938 (J;US)
Breining, M., *See* Berry, S., 8:24539
Breitung, W., *See* Reil, K.O., 8:23547
Brendel, C., *See* Bohne, W., 8:24663
Brenner, D.J., Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R;US)
Brenner, W.C., *See* Malick, F.S., 8:24984
Breton, J., Data acquisition system of TFR tokamak experiment, 8:25192 (J;US)
Brewitz, W., Summarized representation of the progress and results of the suitability test of the Konrad pit for final storage of radioactive wastes, 8:23125 (R;DE;In German)
Brice, D.K., COREL;RASE4;DAMG2; ion implantation deposition, 8:24718 (R;US)
Extended local mixing model for hydrogen retention and isotope exchange, 8:24797 (J;NL)
Briggs, L.L., *See* Wider, H.U., 8:23592
Brimer, P.A., *See* Hsie, A.W., 8:24416
Brinkerhoff, C.R., *See* Bourcier, D.R., 8:24471
Briscoe, W.J., *See* Nefkens, B.M.K., 8:24611
Britnell, O., Thermal-performance analysis of space-heating systems in the National Solar Data Network, 8:23329 (R;US)
Britt, H.C., *See* Christensen, P.R., 8:24690
Brittingham, J.N., Focus waves modes in homogeneous Maxwell's equations: Transverse electric mode, 8:24757 (J;US)
Brixy, H., *See* Meier, B., 8:24204
Broadway, J., *See* Blanchard, R., 8:24265
Brocken, H.J.B.M., *See* Notermans, G.H.J., 8:24773
Brockmann, R., Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage, 8:23439 (R;DE;In German)

Brodsky, M.B., Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R;US)
Superconductivity in Au-Cr-Au and Ag-Pd-Ag epitaxial metal film sandwiches, 8:23944 (R;US)
Brolsman, A., Analysis of diffraction from [001] twist boundaries in cubic metals, 8:23951 (R;US)
Bromberg, C., Study of A_2 production in the reaction $\pi^- p \rightarrow K^0 K^- p$ at 50, 100, and 175 GeV/c, 8:24601 (J;US)
Bronisz, S.E., Flight-systems safety program, September 1982. Progress report, 8:23202 (R;US)
Bronner, G., INTOR power handling and conversion, 8:25071 (J;US)
Brookes, C., *See* Altman, H., 8:25108
Brooks, A.L., *See* Clark, C.R., 8:24456
Brooks, E.R., *See* Eppley, R.W., 8:24272
Brooks, J.N., Erosion and redeposition analysis for limiter and divertor impurity control systems, 8:24878 (J;NL)
Redeposition of the sputtered surface in limiters, 8:25166 (J;US)
See Evans, K. Jr., 8:24951
See Mattas, R.F., 8:25174
See Smith, D.L., 8:25172
Brooks, N., *See* Taylor, T., 8:24896
Brooks, N.H., *See* Mahdavi, M.A., 8:24865
Brooks, R.L., Hyperfine structures of the nd $^1D(n = 3 - 8)$ states of ^3He I, 8:24518 (R;US)
See Berry, H.G., 8:24514
Bross, A., Detection of minimum ionizing particles with a charge coupled device, 8:24206 (J;NL)
Brossmann, U.B., Development of tf coil support concepts by design methodology in the case of a Bitter-type magnet, 8:25004 (J;US)
Broude, C., *See* Bertschat, H.H., 8:23957
Brower, D., Start-up and operation of the Texas Experimental Tokamak, 8:24944 (J;US)
TEXT toroidal field power supply operation, 8:25027 (J;US)
See Wildi, P., 8:25028
Brown, B.B., *See* Mahdavi, M.A., 8:24865
Brown, C., *See* Keiser, J., 8:23900
See Lynch, P., 8:23901
Brown, E.L., *See* Wang, S.T., 8:23778
Brown, G., *See* Rappe, G.H., 8:25160
Brown, G.M., Small CAMAC-based data acquisition system, 8:25191 (J;US)
TFTR structural instrumentation, 8:25190 (J;US)
See Perry, E.D., 8:25215
Brown, H.L., *See* Grogan, P.J., 8:23856
Brown, J.S., *See* Williams, M.D., 8:23563
Brown, N.J., *See* Wallerstein, E.P., 8:25142
Brown, P.D., Impact of extended burnup on the BWR fuel cycle, 8:23534 (RA;US)
Brown, R.L., *See* Ballou, J.K., 8:24125
See Gray, W.H., 8:25017
See Miller, J.R., 8:24126
See Shen, S.S., 8:25014
Brown, S.R., *See* Berk, J.V., 8:23832
Browne, J.C., *See* Green, T.A., 8:24556
Broxton, D., Detailed petrographic descriptions and microprobe data for drill holes USW-G2 and UE25b-1H, Yucca Mountain, Nevada, 8:24485 (R;US)
Broxton, D.E., *See* Hardy, L.C., 8:23100
Bruemmer, S.M., Grain boundary segregation and intergranular corrosion of nickel, 8:23898 (RA;US)
Bruet, M., French analytical experience on high burnup performance of PWR fuel elements under steady-state conditions, 8:23486 (RA;US)
Bruggink, P.R., Underground coal gasification product quality parameters, 8:22940 (J;US)
Bruinsma, R., Theory of anion ordering in TMTSF compounds, 8:24027 (R;US)
Brulle, R.V., *See* Anderson, J.W., 8:23395
Brun, T.O., *See* Susman, S., 8:24058
Brunk, J.L., *See* Noshkin, V.E., 8:24295
Bryson, J.W., *See* Fowler, P.G., 8:24086
Buchanan, R.C., Densification of monoclinic ZrO_2 with vanadate additives. Final report 1 Mar 79-1 Mar 82, 8:23991 (R;US)
Buckley, O.E., *See* Boyd, D.W., 8:23390
Buckner, M.R., *See* Weber, A.H., 8:24250
Budny, R., *See* Fonck, R.J., 8:24864
Buechl, K., D/sub 2/ - pellet injection system, 8:25119 (J;US)
Buelt, J., Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R;US)
Buergel, M., Dissociation of 15 MeV/nucleon ^{20}Ne in collisions with ^{197}Au: direct reactions leading to particle-emitting states, 8:24693 (RA;DE;In German, English)
Search for 'fast fission' at the system $^{20}Ne + {}^{197}Au$, 8:24696 (RA;DE;In German, English)
See Gamp, A., 8:24695
See Homeyer, H., 8:24694
See Kovar, D.G., 8:24659, 8:24661
See Rauch, W., 8:24660
Bunce, G.M., High energy spin physics - 1982, 8:24574 (B;US)
Bunick, G.J., *See* Olins, D.E., 8:24316
Bunn, J.M., *See* Payne, F.A., 8:23227
Bunshah, R.F., *See* Keller, L., 8:24882
Burger, L.L., Iodine-fixation studies at the Pacific Northwest Laboratory, 8:23165 (R;US)
Status of physical data on tritium and its behavior in fusion related systems, 8:25126 (J;US)
Burger, M.J., ZONE; 2-dimensional finite element mesh generator, 8:25235 (R;US)
Burke, J.C., *See* Heit, M., 8:24288
Burke, R.J., Radiation shielding issues on the FMIT, 8:24979 (J;US)
Burke, R.P., In-plant considerations for optimal offsite response to reactor accidents, 8:23574 (R;US)
Burley, E.L., Oxygen suppression in boiling-water reactors: Phase 2. Final report, 8:23447 (R;US)
Burnetti, J.A., *See* Der, Z.A., 8:24494
Burnham, A.K., *See* Singleton, M.F., 8:23086
Burns, R.E., Funding nuclear-power-plant decommissioning. Final report, 8:23536 (R;US)
Burnworth, H.F., *See* Green, L.M., 8:23406
Burr, B., Transposable elements and genetic instabilities in crop plants, 8:24339 (J;US)
Burr, F., *See* Burr, B., 8:24339
Burrell, K.H., *See* Mahdavi, M.A., 8:24865
See Muller, C.H. III, 8:24763
Busch, F., *See* von Oertzen, W., 8:24674
Bushby, H.M., *See* Krazinski, J.L., 8:24157
Busse, W., Tandem-injector for VICKSI, 8:24181 (RA;DE;In German)
See Arndt, P., 8:24161
Butler, E.P., *See* Field, D.J., 8:23926
Butler, M., *See* Wilcke, W.W., 8:24685
Butt, R., PAC investigation of the orientation of lattice defects in electron irradiated aluminium single crystals, 8:23962 (RA;DE;In German)
See Metzner, H., 8:23964
Button, J.B., *See* Merritt, B.T., 8:25068
Buttram, M., Cherenkov light as a current-density diagnostic for large-area, repetitively pulsed electron beams, 8:24186 (R;US)
Buyco, E.H., *See* Krazinski, J.L., 8:24157
Buyukozturk, O., Thermomechanical behavior of refractory concrete linings, 8:22939 (J;US)
Byerly, R.T., Phase II: frequency domain analysis of low-frequency oscillations in large electric power systems. Volume 1. Basic concepts, mathematical models, and computing methods. Final report, 8:23434 (R;US)
Byington, G.A., Two-phase helium-IV quench analysis for superconducting magnets, 8:25010 (J;US)
Byrne, P.F., Megavolt arsenic implantation into silicon, 8:24042 (J;CH)
Bywater, J., *See* Praeg, W.F., 8:24970

C

Cabibbo, N., Perspectives on weak interactions, 8:24579 (RA;US)
Cabraal, A., *See* Griffith, S.K., 8:23761
Cacheiro, N.L.A., *See* Ashley, T., 8:24337
See Russell, L.B., 8:24335, 8:24336
Cachet, H., *See* Bourrasse, A., 8:23262
Cadwell, L.L., *See* Beedlow, P.A., 8:23172
Caemmerer, D., Present state of technology of recovery and conversion process for synthetic fuels - volume II, 8:23223 (R;US)
Present state of technology of recovery and conversion process for synthetic fuels - Volume 1, 8:23224 (R;US)
Caffey, T.W.H., Locating a buried magnetic dipole, 8:24155 (J;US)
Caffo, A.L., *See* Lubin, A.H., 8:24300
Cahalan, J.E., *See* Wider, H.U., 8:23592
Cain, K.T., *See* Generoso, W.M., 8:24384, 8:24430
Cain, W.D., *See* Gray, W.H., 8:25002
Cain, W.S., Odor control through ventilation: smoking vs. nonsmoking occupancy. Paper 81.22.5, 8:23830 (J;US)
See Leaderer, B.P., 8:23831
Cairns, E.J., *See* Katz, M.H., 8:23679
Calaby, L.F., *See* Murray, H.A., 8:25106
Calderon, M.O., *See* Chargin, A.K., 8:24941
See Pedrotti, L.R., 8:24845
Caldwell, M.M., Action spectra for photosynthetic inhibition. Final report, 8:24373 (R;US)
Higher plant response to elevated ultraviolet irradiance. Final report, 8:24374 (R;US)
See Robberecht, R., 8:24372

Calkins, P., *See* Resen, M., 8:23887
Calliger, R.J., *See* Severyn, J.R., 8:25152
Callis, R., *See* Mahdavi, M.A., 8:24865
Calm, J.M., *See* Asbury, J.G., 8:23664
Calpin, J.E., *See* Bellomo, P., 8:25075
Calvin, M., New sources for fuel and materials, 8:23282 (J;US)
Camp, A.L., A model for predicting containment response to hydrogen burns, 8:23654 (J;US)
Camp, L.B., *See* Caldwell, M.M., 8:24373
Campbell, D., *See* Engelhardt, W., 8:24863
See Vernickel, H., 8:24859
Campbell, D.K., Polarons in quasi-one-dimensional systems, 8:24024 (J;US)
Campbell, S.A., *See* Behroozi, F., 8:24002
Camposilvan, J., *See* Reiter, F., 8:25161
Canela, F., Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report, 8:23416 (R;US)
Cantor, D.J., Natural gas revenues of major energy companies, 1977-1981, 8:23064 (R;US)
Capano, C., *See* Trautmann, C.H., 8:23437
Caplan, M., *See* Shively, J.F., 8:24836
Caporuscio, F., *See* Broxton, D., 8:24485
Caramanis, M., Utility Spot-Pricing Study: Wisconsin, 8:23748 (R;US)
Carder, J.H., ANOVA; three factor analysis of variance, 8:25247 (R;US)
Caretta, A., *See* Schneider, H., 8:25006
Carguila, G., *See* Stern, E., 8:25023
Carguilia, G., *See* Stern, E., 8:25022
Carhart, R.A., Improved method for predicting seasonal and annual shadowing from cooling-tower plumes, 8:24401 (R;US)
Carlson, B.C., ELLIPTIC; elliptic integrals by duplication, 8:25262 (R;US)
Carlson, D.D., Interim Reliability Evaluation Program procedures guide, 8:23629 (R;US)
Carlson, K.C., *See* Manny, E.F., 8:24390
Carlson, N., *See* Farhadieh, R., 8:23597
Carlson, R., *See* Chan, M.L., 8:23744
Carlson, R.L., Helios: a 15 TW carbon dioxide laser-fusion facility, 8:24915 (J;US)
Carlson, R.V., *See* Bartlit, J.R., 8:25130
Carlton, J.E., *See* Coffey, J.L., 8:24404
Carnahan, T.G., In-place leaching of uranium, copper, and evaporites, 8:23101 (R;US)
Carnall, W.T., Spectroscopic properties of the f-elements in compounds and solutions, 8:24078 (R;US)
Carnevale, G., *See* Weiss, J., 8:25280
Carpenter, D.A., *See* Russell, W.L., 8:24422, 8:24425
Carpenter, D.O., Peptide-induced emesis in dogs: possible relevance to radiation-induced emesis. Final report Oct 80-Sep 81, 8:24358 (R;US)
Carpenter, J., Evaluation of structural integrity of IPNS-I and ZING-P' targets, 8:24171 (R;US)
Carpenter, J.P., *See* Carlson, R.L., 8:24915
Carr, S.L., *See* Hamilton, W.C., 8:25019
Carrasco, A., *See* Adler, H.I., 8:24380
Carricarte, V.C., *See* Sega, G.A., 8:24433
Carrier, W.L., *See* Regan, J.D., 8:24417
Carruthers, J., *See* Rodwell, P., 8:22967
Carruthers, W.D., *See* Lindberg, L.J., 8:24014
Carter, J., *See* Bohne, W., 8:24663
Carter, J.G., *See* Kopp, M.K., 8:24207
Carter, L.D., *See* Streets, D.G., 8:24255
Carter, W.B., Experimental observation of a non-constant recombination coefficient - H/Pd(110); possible implications for hydrogen recycle in tokamaks, 8:24900 (J;NL)
Casadei, F., Experimental investigation of the unsteady one-phase flow through perforated plates, 8:23620 (R;DE;In German)
Casal, V., Thermal and mechanical behaviour of PWR fuel rod simulators for LOCA-experiments, 8:23619 (R;DE)
Cash, D.J., Earthquake catalog for northern New Mexico. Progress report, January-March 1982, 8:24489 (R;US)
Caskey, G.R. Jr., Helium embrittlement of stainless steels at ambient temperature, 8:24911 (J;US)
Casperson, D.E., *See* Carlson, R.L., 8:24915
Caspi, S., *See* Taylor, C., 8:24117
Cass, R.W., Shoreside boiler demonstration of fuel-water emulsions. Final report Mar 80-Aug 82, 8:23047 (R;US)
Cassady, P.E., *See* Willenberg, H.J., 8:24973
Cassel, R.L., Design and cost of the TFTR power conversion system, 8:25133 (J;US)
See Bellomo, P., 8:25075
Cassulo, J.C., *See* Gabor, J.D., 8:23598, 8:23599
Casteels, F., Corrosion of materials in a clay environment, 8:23145 (RA;DE)
Caton, R.B., *See* Meranger, J.C., 8:24246
Cava, R.J., *See* Cox, D.E., 8:24044
Cecchi, J.L., Reduction of recycling by pumping at the PDX limiter, 8:24857 (J;NL)
Tokamak limiter design, 8:25200 (J;US)
See Fonck, R.J., 8:24864
See Sredniawski, J.J., 8:25211
Celesk, E.M., *See* Rader, J.I., 8:24465
Celoni, C., CONF; conference attendee & speaker data file, 8:25254 (R;US)
Cerbone, R.J., *See* Lu, M.S., 8:23653
Cermak, J.E., *See* Poreh, M., 8:23816
Cerny, J., *See* Bice, A.N., 8:24701
Cesana, P., *See* Birattari, C., 8:24203
Cesari, F., Thermomechanical analysis of a SPX 1 type sodium-air heat exchanger, 8:23515 (R;IT;IT)
Cha, B.K., NUBOW-2D Inelastic; bowed reactor core analysis, 8:23514 (R;US)
Chakraborty, B., Electronic structure and formation energy of a vacancy in aluminum, 8:23937 (R;US)
Positron-annihilation spectroscopy of vacancy defects in aluminum, 8:23939 (R;US)
Positron-annihilation characteristics in real solids including many-body enhancement effects, 8:24721 (R;US)
See Fluss, M.J., 8:23940, 8:23942
Chakravati, S., *See* Liu, Q.K.K., 8:24645, 8:24652
Chan, D., FCHART/SLR2.0; solar heating system performance, 8:23311 (R;US)
Chan, F.T., *See* Ho, T.S., 8:24528
Chan, M.L., Issues in implementing a load-management program for direct load control. Final report, 8:23744 (R;US)
Chan, S.K., Ostwald ripening of precipitates and irreversible phenomena, 8:24056 (R;US)
Chandlee, C., *See* Jensen, T., 8:24623
Chandra, S., Analytical investigations of the relative solar rating concept. Final report. Report Number FSEC 80-6, 8:23319 (R;US)
Chang, B.P., *See* Sun, A.Y., 8:24466
Chang, F., *See* Levy, M., 8:23899
Chang, F.H., Effects of simulated acid precipitation on carbon and nitrogen mineralization in soil, 8:24256 (RA;US)
Chang, J., *See* Huang, S., 8:24924
Chang, S.S., *See* Rahn, R.O., 8:24413
Chang, Y.I., *See* Kosobud, R.F., 8:23701
Chang, Y.K., *See* Young, R.T., 8:23288
Chao, P.K.B., *See* Ozoe, H., 8:23350
Chapin, D.L., *See* Chi, J.W.H., 8:24976
Chapin, T.J., Performance of a high-pressure-hydrogen time-projection chamber, 8:24196 (R;US)
Chapman, R.H., *See* Longest, A.W., 8:23651
Chargin, A.K., Overview of the Tandem Mirror Experiment-Upgrade, 8:24941 (J;US)
See Pedrotti, L.R., 8:24845
See Wong, R.L., 8:24985
Charles, R.G., Cleaning steam generators off-line (soaking) with chelants. Final report, 8:23497 (R;US)
Chasanov, M.G., *See* Dunn, P.F., 8:23767
Chase, R.P., *See* Mahdavi, M.A., 8:24865
Chason, M.K., *See* Fluss, M.J., 8:23940
See Smedskjaer, L.C., 8:23933, 8:23941
Chato, J.C., *See* Crowley, J.M., 8:23435
Chatterton, P.A., *See* Sethuraman, S.K., 8:24885
Chaumont, D., *See* Gudin, C., 8:23276
Cheetham, A.D., *See* Lietti, A., 8:24926
Chemeris, V.T., *See* Zhurakhovskii, V.A., 8:24750
Chen, C.H., *See* Payne, M.G., 8:24559
Chen, C.K., *See* Roth, J., 8:24775
Chen, C.P., *See* Cheng, C.F., 8:23315
Chen, C.W., Overview of the integrated lake-water acidification study (ILWAS), 8:24281 (RA;US)
Chen, J., *See* Duan, W., 8:24884
Chen, K., Reclamation of transformer oils containing PCBs by the Sunohio PCBX Process. Final report, 8:23038 (R;US)
Chen, L., *See* Guzdar, P.N., 8:24779
Chen, S., Incoherent quasielastic neutron scattering from water in supercooled regime, 8:24730 (J;US)
Chen, S.S., *See* Jendrzejczyk, J.A., 8:23469
Chen, W.K., *See* Peterson, N.L., 8:23995
Chen, Y., *See* Tsang, K.L., 8:24009
Chen, Y.M., *See* Burns, R.E., 8:23536
Chen, Y.S., Role of M1 transitions in the quasicontinuum, 8:24672 (R;US)
Chenevas-Paule, A., *See* Bellissent, R., 8:23261
Cheng, C.F., Corrosion problems associated with solar fluid and components, 8:23315 (R;US)
Cheng, E.T., Neutronic design for the TFTR lithium blanket module, 8:24975 (J;US)
See Hopkins, G.R., 8:24934
See Wong, C.P.C., 8:24977, 8:24978
Chenoweth, J.M., *See* Halle, H., 8:23846

Chern, W.S., Residential demand for energy: a time-series and cross-sectional analysis for eight OECD countries, 8:23818 (R;US)

Cheme, A., Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel, 8:23463 (RA;US)

Cheung, N.W., *See* Byrne, P.F., 8:24042

Chi, J.W.H., Preconceptual design of a packed fluidized bed blanket for a fission suppressed thorium-fueled CTHR, 8:24976 (J;US)

Chianese, R.B., Iterative numerical procedure for determining the shape of a constant tension 'D' magnet, 8:24986 (J;US)

See Lee, A.Y., 8:25209

See Malick, F.S., 8:24984

Chikalla, T.D., Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R;US)

Child, H.R., *See* Koehler, W.C., 8:24732

See Wignall, G.D., 8:24073

Child, M., *See* Halonen, L., 8:24552

Childs, W., Plant Materials Program: progress June 1981-May 1982, 8:23465 (R;US)

Ching, W.Y., *See* Veal, B.W., 8:24030

Chinnery, M.A., Seismic discrimination. Semiannual technical sumMary report no. 36, 1 Oct 81-31 mar 82, 8:24222 (R;US)

Chiu, Y.T., *See* Schulz, M., 8:24509

Cho, D.H., *See* Spencer, B.W., 8:23594

Chodura, R., Numerical analysis of plasma-wall interaction for an oblique magnetic field, 8:24794 (J;NL)

Choi, C.K., Proceedings - 9th symposium on engineering problems of fusion research, 8:24982 (J;US)

Choi, E.K., *See* Shively, J.F., 8:24836

Choi, K., *See* McGregor, D.H., 8:24357

Choi, K.W., *See* Lee, J., 8:23884

Chou, Y.H., *See* Chapin, T.J., 8:24196

Chow, L.S.H., COMRC1; slag transport models for MHD systems, 8:23766 (R;US)

SLGTR; slag transport models for duct surfaces, 8:23764 (R;US)

Chowdhury, P., *See* Khoo, T.L., 8:24681

Christensen, D.H., Geophysical investigations of the Western Ohio-Indiana region. Annual report, October 1981-September 1982, 8:24492 (R;US)

Christensen, E.H., *See* Peck, S.D., 8:25011

Christensen, E.L., *See* Malanify, J.J., 8:23198

Christensen, P.R., Bombarding energy dependence of angular momentum transfer in deep inelastic collisions, 8:24690 (J;NL)

Christianson, C.C., *See* Lee, J., 8:23884

See Miller, J.F., 8:23676

Christianson, L., *See* Resen, M., 8:23887

Christie, D.J., *See* Gritton, D.G., 8:25150

Christie, N.T., *See* Jacobson, K.B., 8:24412

Christodoulides, A.A., Electron affinities of atoms, molecules, and radicals, 8:24525 (R;US)

See Christophorou, L.G., 8:24524

Christophorou, L.G., Electron-attachment processes, 8:24524 (R;US)

See Christodoulides, A.A., 8:24525

See Hunter, S.R., 8:24523

See Kopp, M.K., 8:24207

See McCorkle, D.L., 8:24526

Chrzanowski, J.H., Epoxy impregnation system for TFTR large coil program, 8:24919 (J;US)

Chu, E.H.Y., Area program in population genetics. Final report, November 1, 1975-August 31, 1982, 8:24366 (R;US)

Chu, M.S., *See* Jensen, T.H., 8:24917

See Lee, J.K., 8:24786

Chung, K.S., Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior, 8:23601 (R;US)

Chung, P.M., COMB; 1-dimensional high-temperature coal combustor model, 8:23765 (R;US)

Churchill, S.W., *See* Ozoe, H., 8:23350

Churchill, T.L., *See* Willenberg, H.J., 8:24952

Churlik, D.G., Extending BWR burnup with spectral shift control, 8:23535 (RA;US)

Churton, B.M., Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R;US)

Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R;US)

Cipolla, J.W. Jr., Temporal development of a plasma sheath, 8:24805 (J;GB)

Claassen, H.A., Recycling of metal impurities in the limiter shadow region of a tokamak, 8:24875 (J;NL)

Clark, A.F., Thermal expansion of several materials for superconducting magnets, 8:24127 (J;US)

Clark, C.R., Mutagenicity of diesel exhaust particle extracts: influence of driving cycle and environmental temperature, 8:24456 (J;US)

Clark, D.E., Solidification of oils and organic liquids, 8:23118 (R;US)

Clark, H.J., Economics of spent LWR fuel storage, 8:23116 (R;US)

Clarke, D.R., *See* Jantzen, C.M., 8:23134, 8:23181

Clarkson, J.E., *See* Singleton, M.F., 8:23086

Clausen, M.J., Review of qualification for nuclear power plant operators, 8:23537 (J;US)

Clausing, R.E., Some factors affecting the dynamics of a plasma-wall interaction simulator, 8:24899 (J;NL)

Claussen, N., *See* Bentsen, L.D., 8:24016

Cleary, J.G., *See* Charles, R.G., 8:23497

Clemens, F., *See* Wright, K.E., 8:25128

Clemmer, R.G., *See* Morgan, G.D., 8:24956

See Rogers, A.G., 8:24958

Clesceri, N.L., *See* Vasudevan, C., 8:24236

Clinard, J.A., CREEP-PLAST2; 2-dimensional inelastic structural analysis, 8:24090 (R;US)

Cline, C.F., First quarterly report of the DARPA dynamic synthesis and consolidation program, 8:24008 (R;US)

Clinton, S.D., Mass transfer in a bubble-agitated liquid-liquid system, 8:24139 (J;US)

See Fischer, P.W., 8:25131

Close, D.A., On-line, real-time measurements of decontamination factors for a low-level waste incinerator, 8:23179 (J;NL)

Close, F.E., Quantum chromodynamics and the helicity structure of psi→$\gamma 2^{++}$, 8:24629 (J;US)

Clover, M., *See* Buergel, M., 8:24693

See Gamp, A., 8:24695

See Homeyer, H., 8:24694

Clover, M.R., *See* Bohlen, H.G., 8:24647, 8:24648

Cochrane, J.C., *See* Sgro, A.G., 8:24792

Coester, F., Nuclear forces and nuclear matter including pions and isobars, 8:24703 (R;US)

Coffey, J., *See* Spencer, H., 8:24461

Coffey, J.L., Radiation-dosimetry and chemical-toxicity considerations for ^{99}Tc, 8:24404 (R;US)

Coffin, L.F., *See* Prater, T.A., 8:23902

Cohen, A., *See* Breton, J., 8:25192

Cohen, B.I., Influence of collisions and incoherence on ion-cyclotron transport in mirror plasmas, 8:24789 (J;US)

Cohen, E.G.D., *See* Lopez de Haro, M., 8:24751

Cohen, G., *See* Jess, M., 8:23740

Cohen, J.S., *See* West, B.W., 8:24553

Cohen, L., *See* Costello, F., 8:24264

Cohen, N., Application of a multiple least-squares regression program to dual energy NaI-CsI(T1) measurements, 8:24368 (RA;US)

Assessment of surrogate structures for whole body counting, 8:24735 (RA;US)

Body burden estimation of P-32 by measurement and calibration of Bremsstrahlung radiation produced in the head, 8:24369 (RA;US)

Calibration of phoswich detectors for the in vivo measurement of americium, plutonium and uranium: interlaboratory comparison using the Lawrence Livermore calibration, 8:24733 (RA;US)

Design and construction of a knee phantom for the calibration of Am-241 in bone, 8:24734 (RA;US)

Estimation of the cumulative exposure to uranium mine atmospheres by in vivo mesurements of lead-210 in the skull, 8:24736 (RA;US)

In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982, 8:24197 (R;US)

Low-energy, photon-emitting nuclides: reference spectra library, 8:24737 (RA;US)

Preliminary analysis of data obtained from participation in the IAEA human-mock plutonium intercalibration experiment, 8:24367 (RA;US)

Cohen, R.H., *See* Cohen, B.I., 8:24789

Cohen, S., *See* Fonck, R.J., 8:24864

See Stratton, B.C., 8:24770

Cohn, C.E., Improved stabilization scheme for computerized pulse-height analyzers, 8:24205 (J;NL)

Cohn, J., Energy future Santa Cruz. A citizens' plan for energy self-reliance: executive summary, 8:23791 (R;US)

Cole, J.E., *See* Gordon, A.S., 8:24481

Cole, K.C., *See* Mazur, P., 8:24397

Cole, R.L., Storing solar energy in thermally stratified tanks, 8:23356 (R;US)

Coleman, K.J., *See* Hirshfeld, D.S., 8:23035

Coleman, T.A., Extended burnup fuel performance, 8:23476 (RA;US)
Colleraine, A.P., *See* Nerem, A., 8:25090
Collins, H., *See* Hidy, G.M., 8:24224
Collins, M., *See* Marienfeld, C.J., 8:24457
Colombo, P., *See* Clark, D.E., 8:23118
Conley, L.A., *See* Streets, D.G., 8:24255
Conn, R.W., *See* Kim, N.S., 8:24989
See Pontau, A.E., 8:24854
See Prinja, A.K., 8:24853
See Talmadge, S., 8:24852
Conway, J., *See* Klainer, S.M., 8:24294
Cook, B.A., *See* Mason, R.E., 8:23496
Cook, D.L., Preliminary conceptual design and engineering aspects of a light ion fusion target development facility (TDF), 8:25136 (J;US)
Cook, G., *See* Jorgensen, J.D., 8:23684
Cook, J.L., VARR2; CRBRP 2-dimensional transient fluid flow analysis, 8:23509 (R;US)
Cook, J.M., *See* Berry, G.F., 8:23771
Cook, J.S., Regulation of transport systems in cultured mammalian cells, 8:24352 (RA;US)
Cook, W.A., INGEN; finite element program mesh generator, 8:25261 (R;US)
Cooke, N.E., World developments in coal liquefaction processes and how these developments could affect South American coal owning nations, 8:22934 (R;MX)
Cooke, R.H., Some specialized radiological-safety considerations at Argonne National Laboratory's Heavy Ion Research Facility (SAR, Shielding Design, Q.F.'s, HIRC), 8:24175 (R;US)
Cool, R.L., *See* Chapin, T.J., 8:24196
Cooper, D., *See* Ott, W., 8:25083
Cooper, F., *See* Baker, G.A. Jr., 8:24634
Cooper, R.K., Proceedings of the workshop on LAMPF II synchrotron, 8:24183 (R;US)
Cooper, W.S., Highlights of the Zephyr neutral beam injection system conceptual design, 8:25084 (J;US)
Coops, M.S., *See* Moir, R.W., 8:24838
Cordes, G.A., Organization and structure of an EPRI DATATRAN data bank, 8:23613 (R;US)
Cordier, J.J., *See* Aymar, R., 8:25207
Cornelius, D.K., *See* Oberjohn, W.J., 8:22999
Cornett, C.V., *See* Generoso, W.M., 8:24384, 8:24430
See Russell, W.L., 8:24422
Cornwall, J.M., *See* Schulz, M., 8:24509
Corpus, V., *See* Sun, A.Y., 8:24466
Corsetti, L.V., *See* Pati, S.R., 8:23481
Cortez, B., Results of a first round 150 MeV nu/sub μ/ oscillation experiment and implications for future LAMPF experiments, 8:24597 (RA;US)
Corvin, W.C., Application of power factor correction in the Tandem Mirror Experiment upgrade magnet power supply, 8:25069 (J;US)
Costello, F., NRC TLD Direct Radiation-Monitoring Network. Progress report, July-September 1982, 8:24264 (R;US)
Costin, L.S., Time depdendent crack growth and failure in brittle rock, 8:24500 (R;US)
Cotanch, S.R., Theoretical nuclear reaction and structure studies using kaons and photons. Progress report, 1 February 1982-31 January 1983, 8:24641 (R;US)
Uncertainty in the K^+-nucleus interaction below 1 GeV, 8:24618 (RA;US)
Cothern, C.R., Thoughts about revising the radiation regulations in drinking water concerned with natural radioactivity, 8:24353 (J;US)
Cottrell, J.E., *See* Anderson, R.T., 8:23115
Cottrell, R.L.A., *See* Mestayer, M.D., 8:24602
Councill, D.N., *See* Ainscough, J.B., 8:23489
Countess, R., *See* Hidy, G.M., 8:24224
Court, W.R., *See* Schwenterly, S.W., 8:25009
Courtney, J.C., DEMONR; unbiased Monte Carlo slab shield code, 8:24716 (R;US)
Coutant, R.W., Experimental evaluation of mass transfer from sessile drops, 8:24138 (J;US)
Coutts, G.W., *See* Bell, H.H. Jr., 8:25170
Couture, P., *See* Boucher, C., 8:24862
Coveney, E.A., *See* Moskowitz, P.D., 8:24306
Cowking, C.B., PFR/TREAT programme: objectives, progress and future work, 8:23590 (R;US)
Cowles, C.J., Types of potential effects of offshore oil and gas development on marine mammals and endangered species of the northern Bering Sea and Arctic Ocean. Technical paper no. 9 (final), 8:24290 (R;US)
Cowley, J.M., Imaging and analysis of surfaces using diffracted electrons, 8:24068 (BA;US)
Cox, B., Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours, 8:23920 (RA;US)
Cox, C.H. III, *See* Warner, T.H., 8:23265
Cox, D.E., Neutron powder diffraction study of the lithium insertion compound $LiMoO_2$ from 4 to 440°k, 8:24044 (J;GB)
Cox, J., *See* Brower, D., 8:25027
Cox, N.D., SOERP; second-order error propagation code, 8:25234 (R;US)
Coyne, P.I., Variation in photosynthesis and stomatal conductance in an ozone-stressed ponderosa pine stand: light response, 8:24455 (J;US)
Cozzuol, J.M., *See* Larson, T.K., 8:23658
Crabtree, G.W., *See* Behroozi, F., 8:24002
See Johanson, W.R., 8:23947
See Sinha, S.K., 8:23996
Cramer, B.A., *See* Fuller, G.M., 8:24961
Cranwell, R.M., SWIFT; waste-isolation flow & transport model, 8:23377 (R;US)
Cravo, E., Test of three-body separable pole expansions at negative and positive energies, 8:24749 (R;DE)
Crawford, R.K., Data acquisition system for the neutron scattering instruments at the intense pulsed neutron source, 8:24172 (R;US)
See Haumann, J.R., 8:24173
Creedon, L., *See* Wong, C.P.C., 8:24978
Creedon, R.L., *See* Homeyer, W.G., 8:24980
See Wong, C.P.C., 8:24977
Crespi, H.L., *See* Katz, J.J., 8:24348
Creutz, M., U(3) four-dimensional lattice gauge theory and Monte Carlo calculations, 8:24635 (J;NL)
Cronan, C.S., Lysimeter and soil chemistry studies, 8:24501 (RA;US)
Cropp, L.O., *See* Wyant, F.J., 8:23550
Crosswhite, H., *See* Carnall, W.T., 8:24078
Crosthwait, C.D., *See* Oakberg, E.F., 8:24440
Crouch, F.W., Fractionations of non-porphyrin complexes of vanadium and nickel from Boscan crude oil, 8:24047 (R;US)
Crow, W.D., *See* Adler, H.I., 8:24380
Crowe, B.M., Calculation of the probability of volcanic disruption of a high-level radioactive waste repository within southern Nevada, USA, 8:23189 (J;GB)
Crowley, J.L., *See* Longest, A.W., 8:23651
Crowley, J.M., Electrohydrodynamic pumping in cable pipes. Final report, 8:23435 (R;US)
Crowther, R.L., *See* Brown, P.D., 8:23534
See Churlik, D.G., 8:23535
See Wood, J.E., 8:23461
Crull, A.W., Applied genetic engineering has a place in petroleum production, 8:23022 (J;US)
Cubicciotti, D., *See* Childs, W., 8:23465
Cuderman, J.F., High-energy gas-fracturing development. Quarterly report, October-December 1982, 8:23077 (R;US)
Cue, N., UV-laser photofragmentation of a 2-MeV H_3^+ beam, 8:24515 (R;US)
Culkowski, W.M., ATM; atmospheric transport & diffusion model, 8:24227 (R;US)
Culley, G.C., *See* Tylka, J.P., 8:23593
Culley, G.E., *See* Cowking, C.B., 8:23590
Cumali, Z.O., Analytical developments in interzone and system coupling methodology, 8:23837 (J;US)
Cumming, R.B., Dose response modeling for chemical mutagens, 8:24438 (RA;US)
Inhalation mutagenesis of ethylene oxide: unscheduled DNA synthesis and dominant lethal effects, 8:24435 (RA;US)
Molecular dosimetry of ethylene oxide in the mouse, 8:24436 (RA;US)
Mutagenicity of nonvolatile organics in undisinfected and disinfected wastewater effluents, 8:24439 (RA;US)
Semidynamic inhalation exposure system, 8:24437 (RA;US)
Cunnane, S.C., *See* Sella, G.E., 8:24472
Cure, W.W., *See* Heck, W.W., 8:24403
Curl, R.F., Infrared absorption spectroscopy with color-center lasers. Progress report, April 1 1982-February 15, 1983, 8:24081 (R;US)
Curtice, D.H., Assessment of load-frequency-control impacts caused by small wind turbines, 8:23393 (R;US)
Curtis, G.D., *See* Neill, D.R., 8:23396
Curwen, B., Fabrication of the torus assembly for the OHTE confinement experiment, 8:25213 (J;US)
Cutkosky, R.E., Odd-parity baryons: progress and problems, 8:24609 (RA;US)
Cutsogeorge, G., Wide band fiber optic analog data link, 8:25195 (J;US)

D

D'Andrea, R.F. Jr., *See* Hardy, L.C., 8:23099, 8:23100
See Shettel, D.L. Jr., 8:23098
D'Souza, A.F., *See* Carpenter, J., 8:24171
da Roza, R.A., Particle size for greatest penetration of HEPA filters - and their true efficiency, 8:24244 (R;US)
Dabiri, A.E., Generalized heating and cooling load models for seasonal performance calculation, 8:23838 (J;US)
Dadhich, N., Penrose process of energy extraction in electrodyamics, 8:24504 (R;XA)
Dafni, E., *See* Bertschat, H.H., 8:23957
Dalbey, W.E., Inhalation toxicology, 8:24445 (RA;US)
Dalpiaz, P., Research program at Lear, 8:24591 (RA;US)
Dalrymple, R.A., Appendix: ocean engineering aspects of coastal kelp farming, 8:23258 (RA;US)
Daly, R.T., *See* Crawford, R.K., 8:24172
See Haumann, J.R., 8:24173
Daly, T.A., *See* Kosobud, R.F., 8:23701
Dangouleme, D., *See* Dehon, C., 8:23479
Darling, S.L., Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report, 8:22931 (R;US)
Datz, S., Coherent absorption and emission processes of energetic particles penetrating crystals, 8:24731 (BA;US)
Dau, G.J., Nondestructive evaluation program: progress in 1982, 8:23464 (R;US)
Dauber, E., Potential of organic residues for the production of basic chemical compounds. Pt. 1, 8:23849 (R;DE;In German)
Dauvardis, P.A., *See* Veselka, T., 8:24400
Davenport, J.W., *See* Watson, R.E., 8:24743
Davidovsky, F.D., *See* Bertschat, H.H., 8:23957
Davids, C., *See* Lewis, D., 8:24174
Davidson, J.N., *See* DeWald, A.B., 8:24877
Davidson, K.A., *See* Slaga, T.J., 8:24452
Davies, A.L., *See* Tylka, J.P., 8:23593
Davies, B.E., Cadmium and lead contaminated soils in some British metal mining areas, 8:24260 (J;US)
Davies, J.H., Irradiation tests on barrier fuel in support of a large-scale demonstration, 8:23460 (RA;US)
Davis, A.A., *See* Burke, R.J., 8:24979
Davis, A.O., Lake acidification: its effect on lead mobility in the sediment of two Adirondack lakes, 8:24289 (RA;US)
See Galloway, J.N., 8:24286
Davis, B.E., *See* Bruggink, P.R., 8:22940
Davis, H.H., *See* Papazoglou, T.P., 8:23498
Davis, J.B., *See* Singh, S.K., 8:25044
Davis, J.E., *See* Murray, H.A., 8:25106
Davis, J.W., Synthesis of alpha-amino acids, 8:24071 (P;US)
See Morgan, G.D., 8:25210
Davis, L.G., Modification of Doublet III to a large dee facility, 8:24945 (J;US)
Davis, M.J., *See* Mattox, D.M., 8:24902
Davis, R.A., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Davis, R.F., *See* Tobin, J.G., 8:23981
Davis, S., *See* Fonck, R.J., 8:24864
Davisson, J.P., *See* Fuller, G.M., 8:24961
Dawson, A.G. III, *See* Thomas, W.C., 8:23353
Dawson, A.M., United States Superconducting MHD Magnet Technology Development Program, 8:23779 (J;US)
De, A.K., *See* Lutze, W., 8:23127
De Backer, M., *See* Lepoutre, G., 8:23275
de Graaf, F.A.M., Hydropower from Dutch rivers: a survey of potential and restrictions, 8:23241 (R;US;GE)
De Groot, A.J., *See* Gritton, D.G., 8:25150
de Llano, M., *See* Baker, G.A. Jr., 8:24756
De Marsily, G., Application of systems analysis to the disposal of high level waste in deep ocean sediments, 8:23178 (J;GB)
De Vere, A.P.C., Engineering design and manufacturing of prototype neutral injector for JET, 8:25115 (J;US)
de Vore, D., *See* Sasscer, D.S., 8:23310
de Winter, F., *See* Grunes, H., 8:23324
de Winter, T.A., *See* Segal, H.R., 8:24118
Dean, J.D., *See* Chen, C.W., 8:24281
Deboo, J.C., *See* Mahdavi, M.A., 8:24865
Decher, U., *See* Freeman, R., 8:23494
Declercq, J.G., *See* Hamilton, W.C., 8:25019
Decman, D.J., Perturbed angular distribution in the α-decay; g-factor measurements and spectroscopy of ^{217}Ac, 8:24699 (RA;DE;In German)
Spectroscopy of ^{215}Ac and systematics of the N = 126 isotones, 8:24698 (RA;DE;In German)
See Agarwal, Y.K., 8:24689
DeFord, H.D., *See* Buchanan, R.C., 8:23991
DeGroot, J.S., *See* Mizuno, K., 8:24778
Dehli, M., *See* Schnell, P., 8:23709
Dehmer, J.L., Photoelectron branching ratios and angular distributions for the valence levels of SF_6 in the range 16< or =hν< or =30 eV, 8:24555 (J;US)
See Parr, A.C., 8:24209, 8:24519
Dehon, C., High burnup irradiation programs of the FRAGEMA 17 x 17 standard fuel, 8:23479 (RA;US)
See Atabek, R., 8:23484
Deininger, L., *See* Taylor, D.B., 8:23815
Deis, G.A., *See* Longhurst, G.R., 8:24937
Deksnis, E.B., *See* Hemmerich, J.L., 8:25087
Del Prete, A., Temporal trends in the pH of Woods, Sagamore, and Panther Lakes as determined by an analysis of diatom population, 8:24287 (RA;US)
See Galloway, J.N., 8:24286
Delaney, M., *See* Mattas, R.F., 8:25174
Delaney, M.J., *See* Morgan, G.D., 8:24956, 8:25210
Delbecq, C.J., *See* Susman, S., 8:24029, 8:24058
Delire, C., *See* Bougard, J., 8:23665
Demaret, R.D., *See* Severyn, J.R., 8:25152
DeMarini, D.M., *See* Hsie, A.W., 8:24416
DeMiglio, D.S., *See* van der Sluys, W.A., 8:23906
Demski, R.J., Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R;US)
Simultaneous removal of SO_2 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R;US)
See Yeh, J.T., 8:23428
Den Hartog, P.K., Terminal lens for an FN tandem, 8:24159 (R;US)
den Ouden, C., *See* Verdonschot, J.K.M., 8:23359
Dennis, C., *See* Berry, G., 8:23772
Dennis, C.B., *See* Berry, G.F., 8:23771
Denno, K., Eddy current calculations for the tokamak fusion reactor through fields harmonics content, 8:24998 (J;US)
Prospects of energy transformation between fusion reactor and OTEC plant, 8:25132 (J;US)
Der, Z.A., Analysis of seismic data at RSTN sites and high-frequency seismic signals at TFSO, 8:24494 (R;US)
Derenzo, S.E., Detectors, sampling, shielding, and electronics for positron emission tomography, 8:24342 (R;US)
Dergarabedian, P., *See* Redmann, G.H., 8:23614
Desanti, O., *See* Gudin, C., 8:23276
Deschamps, P., *See* Aymar, R., 8:25207
Deshpande, N.G., Flavor-changing electromagnetic transitions, 8:24606 (R;US)
Status of theories of CP non-invariance, 8:24631 (R;US)
DeStaebler, H., *See* Mestayer, M.D., 8:24602
Deurbrouck, A.W., *See* Sanner, W.S. Jr., 8:22995
Devaney, H.E., *See* Moore, J.G., 8:23131
Devare, H.G., Quadrupole interaction of ^{79}Kr in zinc at high temperatures, 8:23956 (RA;DE;In German)
DeVeaux, J.C., *See* Driemeyer, D.E., 8:24813
Devins, T.B., *See* Lagasse, L.G., 8:24341
deVries, G.J., *See* Lietzke, A.F., 8:25105
DeVries, R.M., Can exotic phenomena be induced in low energy antiproton-nucleus collisions, 8:24620 (RA;US)
See DiGiacomo, N.J., 8:24621
DeWald, A.B., Analysis of the plasma impurity influx from alkali-metal coatings for fusion reactor applications, 8:24877 (J;NL)
See Krauss, A.R., 8:24967
Dhawan, J.C., *See* Cooke, N.E., 8:22934
Dhooge, P.M., Electrochemical studies of coal slurry oxidation mechanisms, 8:22937 (J;US)
Di Marco, J., *See* Phillpott, J., 8:24947
Diamond, R.M., *See* Lindenberger, K.H., 8:24678
Diana, J.J., Behavior of ruthenium during reprocessing of spent reactor fuel, 8:23113 (TG;US)
Diaz, J.A., *See* Lalley, P.A., 8:24378, 8:24418
See Regan, J.D., 8:24377
Dickey, J.O., *See* Bromberg, C., 8:24601
Dickinson, R.A., *See* Rienecker, F. Jr., 8:25149

Dickmann, F., *See* Beck, R., 8:24715
Didwall, E.M., *See* Rodgers, P.W., 8:24220
Dietz, L.A., CONDYN; Polya model secondary electron spectra, 8:24510 (R;US)
Dietz, T.E., *See* Terry, D.R., 8:25186
Diffenbach, R.A., Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R;US)
DiGiacomo, N.J., Effects of strong attraction in antiproton-nucleus scattering, 8:24621 (RA;US)
See DeVries, R.M., 8:24620
Dill, D., *See* Dehmer, J.L., 8:24555
Dillow, C.F., Selection of vacuum seals for EBT-P, 8:25219 (J;US)
Dilorio, G.J., *See* Robinson, W.R., 8:23578
DiMelfi, R.J., *See* Kramer, J.M., 8:23589
Dinegar, R.H., Deflagration-to-detonation transition in PETN and HMX, 8:24211 (R;US)
Dines, A., *See* Altman, H., 8:25108
Dines, E.L., *See* Lindenberger, K.H., 8:24678
Ditmars, J.D., *See* Wang, D.P., 8:23257
Dix, G.E., *See* Wood, J.E., 8:23461
Doane, J., *See* Bowen, N., 8:25123
Doane, J.W., Photovoltaic requirements estimation - a simplified method. Final report, 8:23292 (R;US)
Doblin, C.P., The growth of energy consumption and prices in the USA, FRG, France, and the UK, 1950-1980. Final report, 8:23757 (R;US)
Dobrzelecki, R., Automation of the mud and water circulation process at coal-preparation plant - initial study, 8:22988 (R;PL)
Dodson, L.A., *See* Masker, W.E., 8:24311
Doenitz, W., High temperature water vapor electrolysis (HOT ELLY), 8:23203 (R;DE;In German)
Doerner, R.C., *See* Meek, C.C., 8:23546
Dogniaux, R., Estimates of the daily solar radiation on orientated and inclined receiver surfaces. Final report, 8:23247 (R;US;FR)
Dole, L.R., *See* Moore, J.G., 8:23131
Dolensky, B., *See* Zehlein, H., 8:25013
Domanus, H.M., EVITS; steady state two-dimensional fluid flow, 8:24568 (R;US)
See Lyczkowski, R.W., 8:23640
See Shah, V.L., 8:23542
See Vanka, S.P., 8:23577
Domeracki, D.D., *See* Gundlach, E.R., 8:23041
Donaldson, A., Downhole steam injector, 8:23021 (P;US)
Dongarra, J.J., LINPACK; simultaneous linear algebraic equations, 8:25242 (R;US)
Donnelly, M.I., *See* Hartman, F.C., 8:24320
Dooley, J.L., *See* Hammond, R.P., 8:24938
Dooling, T.R., *See* Zediker, M.S., 8:25154
Doran, D.G., Role of radiation-damage analysis in the fusion program, 8:24830 (R;US)
Dorsett, D., *See* Jacobson, K.B., 8:24412
Dorstewitz, U., *See* Krieb, K.H., 8:22912
Doss, E., U-25B MHD-generator performance, 8:23768 (R;US)
Dougherty, D., *See* Asbury, J.G., 8:23426
Douglas, W.W., *See* Greengard, P., 8:24477
Dow, B.L., *See* Walton, L.A., 8:23488
Downey, J.W., *See* Radousky, H.B., 8:24015
Downs, D.C., *See* Murray, J.E., 8:25145
Doyle, B.L., Simple theory for maximum H inventory and release: a new transport parameter, 8:24798 (J;NL)
See Brice, D.K., 8:24797
Doyle, T.B., *See* Finnemore, D.K., 8:23974
Drake, J.F., Saturation of the lower-hybrid-drift instability by mode coupling, 8:24777 (J;US)
Draper, I.E., *See* Lindenberger, K.H., 8:24678
Draper, W.E., *See* Close, D.A., 8:23179
See Neuls, A.S., 8:23147
Drenski, T.L., *See* Strain, W.H., 8:24463
Drescher, B., Hardware developments, 8:25272 (RA;DE;In German)
Dressendorfer, P.V., *See* Lenahan, P.M., 8:24035
Dressler, R.T., *See* Pittman, P.F., 8:23291
Driemeyer, D.E., Analysis and design of a pumped-limiter impurity-control system for EBTR, 8:25171 (J;US)
Studies of fusion product confinement and heating in EBT reactors, 8:24813 (J;US)
Droege, A.T., *See* Grieman, F.J., 8:24548
Druaux, J., *See* Bonnal, J.F., 8:25088
Dryden, E.H., *See* Bliss, E.S., 8:25146, 8:25147
Duan, W., Studies of unipolar arcing in the mini-torus, 8:24884 (J;NL)
Dubrin, J.W., Laser isotope separation in nuclear-waste by-product utilization, 8:23176 (R;US)
Dudek, L.E., *See* McDade, J.C., 8:25021
See Perry, E.D., 8:25215
Duennweber, W., Spin polarization in $^{20}Ne + {}^{168}Er$ collisions at 13.5 MeV/N, 8:24654 (RA;DE;In German)
See Hartmann, K.H., 8:24710
Duerbrouck, A.W., Current coal preparation research in the United States, 8:22989 (R;MX)
Duesing, G., *See* Obert, W., 8:25203
Duffee, R.A., *See* Flesh, R.D., 8:23833
Duffy, C.J., *See* Ogard, A.E., 8:23109
Duffy, J.M., *See* Suski, G.J., 8:25151
Dumont, J.N., Frog Embryo Teratogenesis Assay: Xenopus (FETAX) - a newly developed screening assay for the detection of teratogens, 8:24419 (RA;US)
See Schultz, T.W., 8:24420
Duncan, A.A., TATB interlaboratory sieving study, 8:24213 (R;US)
Duncan, C.S., Large-area sheet task: advanced dendritic-web-growth development. Annual report, October 23, 1981-October 22, 1982, 8:23267 (R;US)
Dunn, F.E., *See* Wider, H.U., 8:23592
Dunn, P.F., Effect of secondary combustion on nitric oxide concentrations in a MHD combustion gas, 8:23767 (R;US)
Dunn, W.C. Jr., *See* Lalley, P.A., 8:24378
See Regan, J.D., 8:24377, 8:24417
Dunn, W.E., *See* Carhart, R.A., 8:24401
See Policastro, A.J., 8:24252
Dunwoody, W., *See* Merrigan, M., 8:24115
Dupuy, G., Optimization of adsorbate-absorbent couples. Final report, 8:23321 (R;XE;FR)
Duquette, D.J., Environmental effects on fatigue crack initiation and early propagation, 8:23907 (RA;US)
Durand, M., *See* Froebrich, P., 8:24682
Dutcher, J.S., *See* Clark, C.R., 8:24456
Duwe, W.D., *See* Anderson, J.W., 8:23395
Dwiggins, J.C., Solar-energy-system performance evaluation: Terrell D. Moseley office building, Lynchburg, Virginia, October 1978-March 1979, 8:23341 (R;US)
Dyer, G.R., Method for transmitting analog data over a fiber-optic link, 8:25194 (J;US)
Dyer, K.L., Stream water quality in the coal region of Pennsylvania. General technical report, 8:22962 (R;US)
Stream water quality in the coal region of Alabama and Georgia. General technical report (final), 8:22963 (R;US)
Dylla, H.F., Conditioning of ion sources for mass spectrometry of plasmas, 8:24769 (R;US)
See Cecchi, J.L., 8:24857
See Fonck, R.J., 8:24864
See Sredniawski, J.J., 8:25211
Dyman, T.S., Eastern Gas Shales Project (EGSP) data files: a final report. Open-file report 81-598, 8:23051 (R;US)
Dziadosz, D., *See* Smith, M.L., 8:23491

E

Eagle, R.J., *See* Noshkin, V.E., 8:24295
Eakes, R.G., Sewage Solids Irradiator Transportation System (SSITS) cask: preliminary design description, 8:24113 (R;US)
Eames, D.R., *See* Muller, C.H. III, 8:24763
Eason, H.O., *See* Loring, C.M., 8:25121
Easoz, J.R., Testing of water-cooled cathodes on the Westinghouse high surface heat flux test facility, 8:25216 (J;US)
See Lee, A.Y., 8:25209
Easterly, J., *See* Griffith, S.K., 8:23761
Eberhagen, A., *See* Engelhardt, W., 8:24863
See Vernickel, H., 8:24859
Eberhard, P.H., Measurement and theoretical calculation of quench velocities within large fully epoxy impregnated superconducting coils, 8:24123 (J;US)
Eberhardt, L.L., Existing programs, technology, and requirements relative to the conservation and protection of marine mammals in the US fishery conservation zone and in the southern ocean, 8:24271 (R;US)
Ebersbach, K.F., Fundamental study on the feasibility of waste heat utilization in households, 8:23848 (R;DE;In German)
Ebert, G., Study on an example of heat supply from waste heat, 8:23853 (R;DE;In German)
Eckel, J.S., *See* Topmiller, D.A., 8:23630
Eckerman, K.F., GASPAR; evaluation of atmospheric releases, 8:24248 (R;US)
Eckstein, Y., *See* Roach, P.R., 8:24570
Edelmann, H., Development of a telemetry system for seismic application, 8:23012 (R;DE;In German)

Edelstein, A.S., *See* Johanson, W.R., 8:23947
Edelstein, N., *See* Krupa, J.C., 8:23889
Edener, D.L., *See* Parr, A.C., 8:24519
Ediger, M.D., Electronic excited state transport among molecules distributed randomly in a finite volume, 8:24551 (J;US)
Edler, S.K., Reactor-safety research programs. Quarterly report, July-September 1982, 8:23549 (R;US)
Edmonds, P.H., *See* Wooton, A.J., 8:24879
Edmondson, S.E., *See* McCarthy, P.M., 8:23693, 8:23719
Edwards, A.K., *See* Cue, N., 8:24515
Edwards, B.C., *See* McCracken, G.M., 8:24887
Edwards, D. Jr., Very small ionization pressure gauge, 8:24144 (R;US)
Edwards, R.H., Commercial scale production of alfalfa leaf protein concentrate, 8:23869 (J;US)
Efthimion, P.C., *See* Arunasalam, V., 8:24771
Egelhaaf, C., Balance between light-fragment and fission inclusive cross sections of the $^{20}Ne + {}^{197}Au$ reaction between 7.5 and 20 MeV/nucleon, 8:24653 (RA;DE;In German, English)
See Buergel, M., 8:24693, 8:24696
See Duennweber, W., 8:24654
See Gamp, A., 8:24695
See Homeyer, H., 8:24694
See Kovar, D.G., 8:24659, 8:24661
See Rauch, W., 8:24660
Ehhalt, D.H., *See* Bottger, A., 8:24239
Ehrich, H., Initiation of arcing at a plasma-wall contact, 8:24888 (J;NL)
Ehrlich, D., *See* Warnecke, E., 8:23139
Ehsani, M., 10 kA pulsed power supply for superconducting coils, 8:25070 (J;US)
10-kA pulsed power supply for superconducting coils, 8:24821 (R;US)
See Kustom, R.L., 8:24102
Ehst, D.A., Driver options for steady-state tokamak reactors, 8:25079 (J;US)
See Evans, K. Jr., 8:24817
Eichler, J., Molecular dipole deformation as a collective variable in slow atomic collisions, 8:24532 (RA;DE;In German)
See Ho, T.S., 8:24528
See McGuire, J.H., 8:24529
Ellam, G., *See* Deshpande, N.G., 8:24606
Elmerl, D., *See* Summers, M.A., 8:25148
Einstein, J.R., X-ray diffraction, 8:24318 (RA;US)
Eisenlohr, K.H., *See* Imhausen, K.H., 8:22914
Ekmann, J.M., Comparative study of the combustion of alternate liquid fuels, 8:22994 (R;US)
El-Aiat, M.M., Yttrium, an isoelectric donor in /alpha/-Al/sub 2/O/sub 3/, 8:24013 (J;US)
El-Batanouny, M., *See* Goldberg, A., 8:24037
El-Raghy, S.M., *See* Hammad, F.H., 8:23921
Elchlepp, R., Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system, 8:23351 (R;DE;In German)
Eliezer, D., Stress corrosion of type 304 steel in H_2SO_4 alkali halide environments, 8:23912 (RA;US)
Elischer, B.P., *See* Cooper, W.S., 8:25084
Elischer, V., Very high level neutral beam control system, 8:25104 (J;US)
Elliott, D.C., Hydrodeoxygenation of phenolic components of wood-derived oil, 8:23279 (R;US)
Elliott, L.C., *See* Wildi, P., 8:25028
Ellis, B.G., *See* Vicini, F.A., 8:24467
Ellis, H.W., *See* Hunter, S.R., 8:24523
Ellis, P.J., *See* Liu, Q.K.K., 8:24645, 8:24652
Ellis, R.J., Evidence against clusters in ^{12}C nuclei and against the $^1D_2$ 2140 dibaryon resonance, 8:24650 (RA;US)
Ellison, G.B., Laser photoelectron spectroscopy of ions. Progress report, August 1, 1982-July 31, 1983, 8:24527 (R;US)
Elmer, J.W., *See* Wang, S.T., 8:23778
Elrod, D.C., TRUMP; transient & steady state temperature distribution, 8:24135 (R;US)
Elston, S., *See* Berry, S., 8:24539
Emerson, L.C., *See* Clausing, R.E., 8:24899
Emery, V.J., Some basic questions in organic superconductivity, 8:24028 (R;US)
See Bruinsma, R., 8:24027
Emigh, S.G., *See* Mercer, J.E., 8:23397
Emmert, G.A., *See* Bailey, A.W., 8:24870
See Santarius, J.F., 8:25165
Emmett, J.L., Physics of laser fusion. Volume IV. The future development of high-power solid-state laser systems, 8:24844 (R;US)
Endo, M., Waste-water treatment process, 8:24146 (TG;US)
Enge, W., *See* Sermund, G., 8:24201
Engelhardt, W., Divertor efficiency in ASDEX, 8:24863 (J;NL)
See Vernickel, H., 8:24859
Engelking, P.C., *See* Grieman, F.J., 8:24548
Engelstad, R.L., Mechanical response of cavity tube banks in heavy ion beam fusion reactors, 8:25204 (J;US)
Engert, D.E., IBM NJE protocol emulator for VAX/VMS, 8:25266 (R;US)
NJE; VAX-VMS IBM NJE network protocol emulator, 8:25260 (R;US)
Engholm, B.A., *See* Cheng, E.T., 8:24975
See Gorker, G.E., 8:24962
England, C., Energy storage via the carbothermic reduction of sodium oxide, 8:23667 (R;US)
Epler, J.L., Comparative mutagenesis, 8:24415 (RA;US)
Epler, R.G., *See* Dumont, J.N., 8:24419
See Marchok, A.C., 8:24443
Eppley, R.W., Origins of dissolved organic matter in Southern California coastal waters: experiments on the role of zooplankton, 8:24272 (J;DE)
Erents, S.K., Deuterium trapping in low-Z coatings, 8:24898 (J;NL)
Ermak, D.L., Denser-than-air dispersion modeling in the atmosphere, 8:23071 (R;US)
See Morgan, D.L. Jr., 8:23068
Esch, E.L., *See* Davies, J.H., 8:23460
Escombe, F.M., Electric Power Plant International, 8:23421 (R;US)
Essenhigh, R.H., Char combustion and utilization, 8:22993 (RA;CA)
Ethier, S.P., *See* Ullrich, R.L., 8:24388
Eubank, H.P., *See* Kozub, T., 8:25102
See Williams, M.D., 8:25081
Eucker, S.S., Specific heat of in situ superconducting composites, 8:23973 (J;US)
Evans, J.W., Reactive quantum Boltzmann equations: A derivation from an arrangement channel space representation and BBGKY hierarchy, 8:24065 (J;US)
Scattering theory in arrangement channel quantum mechanics, 8:24638 (J;US)
See Nakano, Y., 8:24742
Evans, K. Jr., Alternate-fuel reactor studies, 8:24817 (R;US)
Engineering aspects of a D-D commercial tokamak reactor, 8:24951 (J;US)
Tokamak reactor cost model based on STARFIRE/WILDCAT costing, 8:24818 (R;US)
Evans, R., *See* Lewis, D., 8:24174
Evans, S.J., *See* Loring, C.M., 8:25121
Everett, K.R., *See* Linkins, A.E., 8:23039
Evertz, E., *See* van Heyden, L., 8:23803
Ewing, T., *See* Carpenter, J., 8:24171
Exarhos, C.A., High burnup performance of Exxon Nuclear Company fuel in the H. B. Robinson pressurized water reactor, 8:23477 (RA;US)
Eyssa, Y.M., Energy dump concept for large energy storage coils, 8:25030 (J;US)

F

Faestermann, T., *See* Bohn, H., 8:24202
Fagan, J., *See* Leech, M.C., 8:22974, 8:22975
Fahrner, W.R., Ion implantation in silicon, 8:24208 (RA;DE;In German)
Falewicz, P., *See* Kubicki, J., 8:23989
Falicov, L.M., Spin waves at surfaces and steps in ferromagnets and antiferromagnets, 8:24741 (R;US)
Falk, J.D., *See* Lambright, W.H., 8:24304
Fang, D.Y., Arc velocity and erosion for stainless steel and aluminium cathodes, 8:24886 (J;NL)
Fang, Q.T., FRTP prototype power reactors with neutral-beam heating and pellet injection, 8:25080 (J;US)
Farber, P.S., Environmental and health aspects of waste-to-energy systems, 8:24402 (R;US)
Start-up and performance of a high-sulfur dry-scrubber system, 8:22946 (R;US)
Farhadieh, R., Interaction and penetration of heated UO_2 with limestone concrete, 8:23597 (R;US)
See Stein, R.P., 8:23595
Farmer, R.D., Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications, 8:23013 (R;US)
Fasolo, J.A., Magnetic shielding and eddy current effects measurements in a Doublet III neutral beam injector, 8:25091 (J;US)
Fatmi, A., *See* Crouch, F.W., 8:24047
Faulkner, F.K., TFTR grounding system, 8:25077 (J;US)
Fauth, D.J., *See* Diffenbach, R.A., 8:23219
Fayer, M.D., *See* Ediger, M.D., 8:24551

Feder, G.L., Variations in drinking water quality and the possible effects on human health, 8:24299 (J;US)
Fee, D.C., *See* Johnson, I., 8:24148
See Wilson, W.I., 8:24149
Feehrer, C., *See* Baron, S., 8:23558
Fehlau, P.E., Vehicle monitors for domestic perimeter safeguards, 8:23192 (R;US)
Feige, G., *See* Ingold, G., 8:24198
Feist, J.H., Gas density distribution results for NBSTF, 8:25086 (J;US)
Feldman, R.P., *See* Niyogi, S.K., 8:24313, 8:24414
Feldmeier, H., *See* Bohne, W., 8:24663
Fellin, L., Theoretical and experimental evaluation of the parameters in the new configuration of ETA-BETA II, 8:25218 (J;US)
Fels, A., Magnitude readings of the Lucano-Campano earthquakes of November 23, 1980 as recorded by accelerometers, 8:24487 (R;IT;IT)
Felthauser, K., *See* Thamer, B.J., 8:23097
Fendell, F.E., *See* Redmann, G.H., 8:23614
Feneberg, W., *See* Samain, A., 8:24871
Feng, W.W., Material properties for TR-55 and silicone elastomeric cushions, 8:24033 (R;US)
Fenske, G.R., *See* Kramer, J.M., 8:23589
Ferguson, D., Selection of low-risk design guidelines for energetic events, 8:23591 (R;US)
Fern, J.C., *See* Moebs, N.N., 8:22981
Ferrara, A.A., *See* Berde, D., 8:25187
Ferrari, P., *See* Angelino, G., 8:23865
Ferro, C., Damage and modifications in the Frascati tokamak limiter, 8:24897 (J;NL)
Fesschaye, M., *See* Liu, H., 8:23243
Fesser, K., *See* Campbell, D.K., 8:24024
Fewell, M.E., SOLTES1; thermal energy systems simulation, 8:23663 (R;US)
Fick, D., *See* Flynn, E.R., 8:24658
See von Oertzen, W., 8:24692
Fiedeldey, H., *See* Lipperheide, R., 8:24712
Field, D.J., Effect of trace alloying additions on the high-temperature oxidation of Al-4.2 wt % Mg and Al-3 wt % Li alloys, 8:23926 (RA;US)
Field, J.E., *See* Rienecker, F. Jr., 8:25149
Fielding, S.J., *See* McCracken, G.M., 8:24869
Fields, D.E., CHNSED; sediment & containment transport model, 8:24275 (R;US)
OPTRM; hydrologic transport with optimization, 8:24276 (R;US)
See Fowler, T.B., 8:24277
See Weaver, H.J., 8:24839
Fietz, W.A., *See* Ballou, J.K., 8:24125
Filler, R.S., Teratogenic mechanisms and prescreening system, 8:24441 (RA;US)
Fillo, J.A., *See* Horn, F.L., 8:23213
Findley, D., *See* Gonano, L., 8:23150
Findley, M.E., *See* Flanigan, V.J., 8:23270
Fine, H.A., Heat transfer in building thermal insulation: the thickness effect, 8:23834 (J;US)
Fink, J.K., Calculation of thermophysical properties of sodium, 8:23516 (R;US)
See Green, D.W., 8:24001
Finkenthal, M., *See* Stratton, B.C., 8:24770
Finn, M., *See* Lewis, D., 8:24174
Finn, P.A., Solid oxide compounds - properties necessary for fusion applications, 8:24959 (J;US)
See Morgan, G.D., 8:24956
Finnemore, D.K., Temperature dependence of critical current superconducting for in situ composites, 8:23974 (J;US)
See Eucker, S.S., 8:23973
Firestone, M.A., Analysis of optimal control theory applied to plasma position and current control during neutral beam heating in TFTR, 8:25101 (J;US)
Firth, L., *See* McCracken, G.M., 8:24887
Fisch, N.J., Operating tokamaks with steady-state toroidal current, 8:24765 (R;US)
Fischer, H.P., Installation of a positron annihilation apparatus for the investigation of Fermi surfaces, 8:24725 (R;DE;In German)
Fischer, P.W., Properties of yttrium sorbers which improve tritium sorption rate from liquid lithium, 8:25131 (J;US)
Fischer, S.M., *See* Slaga, T.J., 8:24452
Fisher, J., Economies of scale in electrical generating plants, 8:23751 (RA;US)
Fishman, J.B., *See* Cook, J.S., 8:24352
Fitzgerald, D.H., *See* Nefkens, B.M.K., 8:24611
Fitzgerald, T., *See* Gallagher, J., 8:24302
Fitzpatrick, C.M., *See* Schwenterly, S.W., 8:25009
Fiveland, W.A., *See* Oberjohn, W.J., 8:22999
Fixler, S., *See* Winkler, P., 8:25201, 8:25202
Flanagan, J., *See* Jacobson, K.B., 8:24412
Flanigan, V.J., Thermochemical conversion of biomass to synthetic fuels in a large experimental facility. Gasification Research on Wood (GROW) Project, April 1981-March 1982, 8:23270 (R;US)
Fleeter, R., Antimisting kerosene atomization and flammability. Interim report, 8:23046 (R;US)
Fleischmann, R., *See* Boehm, H., 8:23783
Flesh, R.D., Odor acceptability in the indoor environment. Paper 81.22.3, 8:23833 (J;US)
Fling, W.A., The CS/R process, 8:22903 (RA;CA)
Flinn, J.E., *See* Welch, J.M., 8:23124
Flint, S., *See* Caldwell, M.M., 8:24373
Flintoff, J., *See* Jantzen, C.M., 8:23134
Fluekiger, R., *See* Braginski, A.I., 8:24128
Fluss, M.J., Positron annihilation in solid and liquid Ni, 8:23940 (R;US)
Positron-annihilation study of the equilibrium vacancy ensemble in aluminum, 8:23942 (R;US)
See Chakraborty, B., 8:23939
See Smedskjaer, L.C., 8:23933, 8:23941
Flynn, E.R., Search for giant resonance charge exchange modes using the (^{13}C,^{13}N) reaction, 8:24658 (RA;DE;In German, English)
Flynn, E.T., *See* Layton, R.P., 8:24399
Flynn, K., *See* Kennel, S.J., 8:24321
Fois, M., *See* Bonnal, J.F., 8:25088
Folkerts-Landau, E.M., Energy security in the industrial nations, 8:23723 (R;US)
Folsom, E.N., *See* Tuft, D.B., 8:24216
Folstad, L., Polycarbonate filter technique for collection of sorted cells, 8:24326 (J;US)
Fonck, R.J., Impurity levels and power loading in the PDX tokamak with high power neutral beam injection, 8:24864 (J;NL)
See Cecchi, J.L., 8:24857
Foner, S., *See* Torikachvili, M.S., 8:24041
Fong, C.G., *See* Yugo, J.J., 8:24776
Fong, C.Y., *See* Guttman, L., 8:24039
Fonseca, A.C., *See* Cravo, E., 8:24749
Fontaine, D.C., Solar-energy-system performance evaluation: Ortiz and Reill Developers, Inc., Lot 8 single-family residence, Escondido, California, October 1978-March 1979, 8:23338 (R;US)
Foote, L.J., *See* Kennel, S.J., 8:24321
Foote, R.S., *See* Mitra, S., 8:24310
Fornaca, S., Plasma convection and line-tying, 8:24788 (J;US)
Forney, A.J., *See* Haynes, W.P., 8:23220
Forseman, J.W., *See* Ballou, J.K., 8:24125
Forsyth, E.B., Development of a fully synthetic tape insulation for lapped power cables, 8:23432 (R;US)
Fort, J.A., Thermodynamic analysis of five compressed-air energy-storage cycles, 8:23660 (R;US)
Fortes, M., *See* Baker, G.A. Jr., 8:24756
Foster, C.A., *See* Lunsford, R.V., 8:25118
Foster, J.S., Electric generator, 8:23753 (P;US)
Fouda, S., The Canmet research program on coal pyrolysis - application to eastern Canada, 8:22905 (RA;CA)
Fowler, D.K., Surface mine reclamation for wildlife: a model reclamation plan for southern Appalachia. Final report, 8:22964 (R;US)
See Turner, L.J., 8:24454
Fowler, J.R., Waste sludge composition at the Savannah River Plant, 8:23180 (J;US)
Fowler, P.G., GRFPAK; plot package for CORTES FEM programs, 8:24086 (R;US)
Fowler, R.F., *See* Skinner, D.M., 8:24317
Fowler, T.B., BEACON/MOD3; containment system fluid flow, 8:23579 (R;US)
COMPARE/MOD1A; transient flow with sinks & doors, 8:23468 (R;US)
DAP; deuterium depth profile in uniform solids, 8:23993 (R;US)
DOPSEL; self-shielding in the resonance region, 8:24702 (R;US)
GAPCON-THERMAL3; fuel steady state & transient behavior, 8:23554 (R;US)
GEOCITY; geothermal district heating economics, 8:23384 (R;US)
HAARM3; aerosol behavior log-normal dist model, 8:23582 (R;US)
LCLSQ1; linear least squares with constraints, 8:25264 (R;US)
MESA; maximum entropy time series analysis, 8:25250 (R;US)
NALAP; LMFBR transient response to accident, 8:23581 (R;US)
NONSAP-C; nonlinear stress concrete structures, 8:24026 (R;US)
PELSHIE2; point kernel integration shielding, 8:24720 (R;US)
PRODCOST; utility generating cost simulation, 8:23403 (R;US)
RANDOM NUMBERS; obtained from U235 alpha decay, 8:25256 (R;US)
RO75; reverse osmosis desalting plant design, 8:24093 (R;US)
SOLA-DF; transient 2-dimensional 2-phase flow, 8:24136 (R;US)

TVENT; ventilation system transient analysis, 8:24089 (R;US)
UDAD; uranium dispersion & dosimetry model, 8:23187 (R;US)
WHTM; Wisconsin hydrologic transport model, 8:24277 (R;US)
Fox, G., *See* Bromberg, C., 8:24601
Fox, J.N., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Fox, M., *See* Childs, W., 8:23465
Foyentin, M., *See* Krupa, J.C., 8:23889
Fradin, F.Y., *See* Kumagai, K., 8:23999
Frahn, W.E., *See* Hartmann, K.H., 8:24710
Francis, A.A., *See* Lalley, P.A., 8:24378
See Regan, J.D., 8:24377, 8:24417
Francis, A.J., Allochthonous litter decomposition in three Adirondack lakes, 8:24284 (RA;US)
Franck, J.V., *See* Nerem, A., 8:25090
Francoui, E., *See* Ferro, C., 8:24897
Frank, G., Analysis of radiation exposure, 4th Marine Corps provisional atomic exercise brigade, exercise Desert Rock VII, Operation Plumbbob. Final report 1 Mar 80-15 Jun 81, 8:24360 (R;US)
Franke, C., *See* Bader, A., 8:24177
Franklin, D.G., PWR high burnup licensing assessment, 8:23490 (RA;US)
Frauendorf, S., *See* Leander, G.A., 8:24704
Freeburn, H.R., *See* Pati, S.R., 8:23481
Freedman, S.J., *See* Gagliardi, C., 8:24644
Freeman, A.J., *See* Jarlborg, T., 8:23894
See Knapp, G.S., 8:23945
Freeman, R., High burnup fuel cycle characteristics of conventional and low leakage fuel management schemes for Arkansas Nuclear One Unit 2, 8:23494 (RA;US)
Freiesleben, H., *See* Bohne, W., 8:24687
See Christensen, P.R., 8:24690
Freije, S., FED and starfire icrh systems, 8:25099 (J;US)
Icrh system characteristics, 8:25100 (J;US)
French, D.N., Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA;US)
Microstructural degradation in boiler steels, 8:23928 (RA;US)
Freudenberger, K., *See* Ott, W., 8:25083
Freund, H.P., Relativistic effects on strong Langmuir turbulence, 8:24807 (J;GB)
Frey, D., Class B performance monitoring of passive/hybrid solar buildings, 8:23326 (R;US)
Freyhardt, H.C., *See* Braginski, A.I., 8:24128
Frick, F., *See* Hurley, C.A., 8:25141
Fried, B.D., *See* Banos, A. Jr., 8:24848
Friedlander, S.C., *See* McCarthy, P.M., 8:23693, 8:23719
Friedman, E., *See* Kennel, S.J., 8:24321
Friedman, G.M., Deep-burial diagenesis. Annual progress report, 1982-1983, 8:24498 (R;US)
Friedman, S., *See* Warzinski, R.P., 8:22992
Friese, G.J., Development of modifications for Coflexip flexible drilling pipe for high-temperature and -pressure geothermal service. Final report, 8:23383 (R;US)
Fripiat, J.J., Photochemical dissociation of water adsorbed in artificial membranes made from phyllosilicates. Final report, 8:23208 (R;US)
Frisius, F., Studies of the diffusion of hydrogen in yttrium, 8:23990 (TJ;US)
Fritsch, W., Electron capture in ion-atom collisions at intermediate collision energies, 8:24530 (RA;DE;In German)
L-K vacancy sharing in Ar + Kr collisions, 8:24534 (RA;DE;In German)
Molecular binding effects in electron capture in Li^+ + H collisions, 8:24531 (RA;DE;In German)
Fritz, A.H., Parameters influencing noise emission during hot-saw and cold-saw operations and noise reduction measures, 8:24478 (R;DE;In German)
Fritz, E.S., *See* Sharma, R.K., 8:23409
Froebrich, P., Dynamical coupling of relative motion, deformations and charge transfer within a Fokker-Planck equation for deep inleastic collisions, 8:24682 (RA;DE;In German, English)
Multiple Coulomb excitation of very heavy systems within the classical S-matrix theory, 8:24709 (RA;DE;In German, English)
No need for a new damping mechanism in the system $^{132}Xe + {}^{56}Fe$ at energies below 7.12 MeV/ν, 8:24673 (RA;DE;In German, English)
Role of deformation and shell effects in deep inelastic collisions of $^{86}Kr + {}^{88}Sr, {}^{90}Zr, {}^{92}Mo$ at energies close to the Coulomb barrier, 8:24667 (RA;DE;In German, English)
Frost, C.A., *See* Olson, C.L., 8:24188
Fry, R.J.M., *See* Ullrich, R.L., 8:24388
Frye, K.N., *See* Hirshfeld, D.S., 8:23035
Fryk, H., Studie kring maetning av traedrester vid Nydo Energi i hissmofors (a study of measuring wood residues at nydo energy ltd.), 8:23278 (R;US)
Fu, C.M., Solar-energy-system performance evaluation: J. D. Evans, Inc., House B, Columbia, Maryland, November 1978-March 1979, 8:23331 (R;US)
Fuchs, G., *See* Machner, H., 8:24700
Fuchs, H., *See* Buergel, M., 8:24693, 8:24696
See Egelhaaf, C., 8:24653
See Gamp, A., 8:24695
See Homeyer, H., 8:24694
See Kovar, D.G., 8:24659, 8:24661
See Rauch, W., 8:24660
Fuchs, H.P., *See* Stehle, H., 8:23450
Fuchs, V., *See* Boucher, C., 8:24862
Fuchs, W., Color-center production and lattice expansion in KBr by x-irradiation near room temperature, 8:24076 (R;US)
Conductivity probe and data acquisition for a liquefaction cold model, 8:22926 (R;US)
Fuhrman, J.A., Influence of method on the apparent size distribution of bacterioplankton cells: epifluorescence microscopy compared to scanning electron microscopy, 8:24350 (J;DE)
See Eppley, R.W., 8:24272
Fuhrman, N., *See* Pati, S.R., 8:23485
Fuja, R., *See* Kustom, R.L., 8:24102
See Praeg, W.F., 8:24970
Fuja, R.E., *See* Ehsani, M., 8:24821, 8:25070
Fujii, G., *See* Clark, A.F., 8:24127
Fujimoto, S., *See* Saito, K., 8:24460
Fujimura, R.K., Correlation of structure and functions of proteins involved in phage T5 DNA replication: an approach to study of mutagenesis, 8:24314 (RA;US)
Fujioka, A., *See* Ogata, A., 8:25198
Fujita, M., *See* Ichikawa, M., 8:23454
See Ogata, A., 8:25198
Fujita, T., *See* Takagi, M., 8:24147
Fulkerson, E.S., *See* Oicles, J.A., 8:25076
Fuller, G.M., Key design issues in the definition of the fusion engineering device (FED) first wall and limiter features, 8:24961 (J;US)
See Kirchner, J., 8:25050
Fuller, L.C., RATEPAC; power plant revenue requirements code, 8:23405 (R;US)
Fultz, B.T., Moessbauer spectrometry study of Fe-Ni-X alloys, 8:23970 (R;US)
Funk, V.T., Costs and indexes for domestic oil- and gas field equipment and production operations, 1982, 8:23017 (R;US)
Furfari, S., Hydropyrolysis of coal, 8:22935 (R;GB)
Furfaro, J.P., *See* Oztunali, O.I., 8:23184
Furimsky, E., The pyrolysis of Canadian coals for the production of fuels and petrochemicals, 8:22906 (RA;CA)
Furman, E.R., Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R;US)
Furtak, T.E., *See* Kester, J.J., 8:23987
Furuno-Fukushi, I., *See* Regan, J.D., 8:24417
Furuto, Y., Origin of resistive voltage and the related problems in large-capacity Nb_3Sn conductor, 8:25020 (J;US)
Furuyama, M., *See* Kajiura, S., 8:25212
See Miyata, H., 8:24999, 8:25000
Fussmann, G., *See* Engelhardt, W., 8:24863
See Vernickel, H., 8:24859

G

Gaberson, P.C., *See* Singh, S.K., 8:25044
Gabor, J.D., Application of debris-bed dryout data to CONACS-1 modeling, 8:23599 (R;US)
Effect of particle stratification on debris-bed dryout, 8:23598 (R;US)
Gabriel, J.R., Issues in defining standards for documentation, 8:25267 (R;US)
Gabrielson, V.K., SHOCK; dynamic response of lumped-mass systems, 8:24087 (R;US)
Gac, F.D., *See* Milewski, J.V., 8:24005
Gaensslen, H., *See* Imhausen, K.H., 8:22914
Gaffey, J.D. Jr., *See* Wu, C.S., 8:24806
Gagliardi, C., 0^- to 0^+ beta decay in A = 16, 8:24644 (R;US)
Gaia, M., *See* Angelino, G., 8:23865
Gaj, E.V., *See* Vinogradov, V.N., 8:25274
Galbraith, J.F., Cable-positioning fixtures. Final report, 8:24101 (R;US)

Gale, N.L., *See* Kearney, W.M., 8:24245
Gallagher, J., Simplified approaches to protecting PSD Class I areas. Final report, 8:24302 (R;US)
Galligan, J.M., *See* Pellegrino, J., 8:23985
Galloway, J.N., Lake acidification during spring snowmelt: processes and causes, 8:24285 (RA;US)
Summary of observations from the investigation of the sediments of Panther, Sagamore and Woods, 8:24286 (RA;US)
See Davis, A.O., 8:24289
See Del Prete, A., 8:24287
Gallup, D.R., *See* Carlson, D.D., 8:23629
Galobardes, J.F., *See* Crouch, F.W., 8:24047
Galobardes, M., *See* Crouch, F.W., 8:24047
Gamp, A., Indication of preequilibrium emission in deep inelastic Ar + Au collisions, 8:24695 (RA;DE;In German)
See Buergel, M., 8:24693, 8:24696
See Egelhaaf, C., 8:24653
See Homeyer, H., 8:24694
See Kovar, D.G., 8:24659, 8:24661
See Rauch, W., 8:24660
See von Oertzen, W., 8:24674
Gamp, E., *See* Krupa, J.C., 8:23889
Gampe, S., *See* Dauber, E., 8:23849
Gantayat, A.N., CORTES; thermal & mechanical analysis of tees, 8:24085 (R;US)
Gantner, E., *See* Hassan, A.M., 8:24049
Garcia, C. Jr., *See* Fehlau, P.E., 8:23192
Garcia, S.R., *See* Hardy, L.C., 8:23099
Garfinkel, S., *See* Dalbey, W.E., 8:24445
Garner, F.A., *See* Brager, H.R., 8:23955
Garrett, A.J., Two-dimensional dynamical drainage-flow model with Monte Carlo transport and diffusion calculations, 8:24234 (R;US)
Garrett, B.C., *See* Blais, N.C., 8:24079
See Truhlar, D.G., 8:24063
Garrett, W.R., *See* Payne, M.G., 8:24559
Garvey, D.B., Cogeneration and emission offsets in nonattainment areas, 8:23700 (R;US)
Garvey, G.T., *See* Gagliardi, C., 8:24644
Garzarolli, F., Observations and analyses of the corrosion behavior of PWR fuel, 8:23487 (RA;US)
Gasior, S.J., *See* Demski, R.J., 8:22953
Gates, R., Relationship of an in-situ test facility to a deep geologic repository for high-level nuclear waste. Final report (Task 4), June 1981-October 1982, 8:23151 (R;US)
See Gonano, L., 8:23150
Gatteschi, L., *See* Lyness, J.N., 8:25268
Gaul, G., Light particle emission from the reaction of ^{12}C with ^{58}Ni and ^{197}Au at 25 MeV per nucleon, 8:24666 (RA;DE;In German, English)
Gauster, W.B., *See* Pontau, A.E., 8:24854
Gauthier, A., *See* Aymar, R., 8:25207
Gautier, J.C., *See* Sturtz, G., 8:24070
Gavis, J., Biogeochemistry of trace metals in Chesapeake Bay. Final report, April 1, 1981-March 31, 1982, 8:24278 (R;US)
Gay, E.C., *See* Miller, W.E., 8:23672
Gay, T.J., *See* Berry, H.G., 8:24514
Gebauer, B., *See* Birkelund, J.R., 8:24686
See Froebrich, P., 8:24667
See Gamp, A., 8:24695
See Gaul, G., 8:24666
See von Oertzen, W., 8:24674
Gee, G.W., *See* Jones, T.L., 8:23167
Geekie, R., *See* Liu, H., 8:23244
Gehre, O., *See* Engelhardt, W., 8:24863
See Vernickel, H., 8:24859
Gehrs, C.W., Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R;US)
Geich-Gimbel, C., Direct determination of the quark density ratio d(x)/u(x) in the proton from νp and anti νp interactions, 8:24604 (R;DE)
Gelbard, F., MAEROS user manual, 8:23627 (R;US)
Geldard, J.F., PUBG; purex solvent extraction process model, 8:23111 (R;US)
Gemell, D., *See* Vager, Z., 8:24542
Gemmell, D.S., Using an electrostatic accelerator to determine the stereochemical structures of molecular ions, 8:24516 (R;US)
See Cue, N., 8:24515
Gemuenden, B., *See* Baake, M., 8:24630
Genens, L., *See* Wang, S.T., 8:23778
Generoso, E.E., *See* Grell, R.F., 8:24329
Generoso, W.M., Radiation induction of heritable translocations in mice, 8:24384 (RA;US)
Use of the mouse heritable translocation test in testing chemicals, 8:24430 (RA;US)
Gentle, K., *See* Brower, D., 8:24944
Gentry, W.R., Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982, 8:24522 (R;US)
Geoffrion, J., *See* Boucher, C., 8:24862
George, W.E., *See* Hardy, L.C., 8:23099
Georgopoulos, P., *See* Knapp, G.S., 8:23945
Gerberich, W.W., Stress corrosion cracking: a continuum formulation, 8:23929 (RA;US)
Gerhard, M.A., SLIC; interactive graphics 3-d mesh generation, 8:25259 (R;US)
Gerhards, B., Solar energy model Goennebek, 8:23314 (R;DE;In German)
Gerischer, H., Photochemical, photoelectrochemical and photobiological conversion. Final report, 8:23273 (R;US)
Gerlach, P., *See* Sire, G., 8:24925
Gernhardt, J., *See* Vernickel, H., 8:24859
Gerrald, L.D., *See* Kilian, D.C., 8:23106
Gersch, H.M., *See* Lindberg, L.J., 8:24014
Gershowitz, H., *See* Chu, E.H.Y., 8:24366
Gerstl, S.A.W., *See* Zardecki, A., 8:24726
Geyer, H.K., Off-design study of an open cycle MHD power plant with oxygen enrichment, 8:23769 (R;US)
Solar liquid-metal MHD performance predictions, 8:23299 (R;US)
Gherini, S.A., *See* Chen, C.W., 8:24281
Gherson, P., Effect of a transverse magnetic field on liquid metal two-phase flow pattern, 8:24922 (J;US)
Ghil, M., FASTCAR; solution of Cauchy-Riemann equations, 8:25251 (R;US)
Giannuzzi, A., *See* Childs, W., 8:23465
Gibson, E.D., *See* Finnemore, D.K., 8:23974
Gibson, G.H., *See* Eberhard, P.H., 8:24123
Gibson, R.B., *See* Carlson, R.L., 8:24915
Gierke, G.V., *See* Engelhardt, W., 8:24863
See Vernickel, H., 8:24859
Gies, H., Effects of the product properties upon the ultimate storage medium salt and resulting conditions, 8:23142 (RA;DE;In German)
Giese, P., Seismische studien zur bestimmung der krustenstruktur im bereich der geothermischen anomalie der toskana (seismic studies for defining the structure of the crust within the area of the geothermal anomaly of tuscany). Final report, 8:23374 (R;US)
Giese, R.F., Regional analysis of potential impacts of electric and hybrid vehicles on electric utilities, 8:23729 (R;US)
See Asbury, J.G., 8:23664
Gieseler, G., Potential of organic residues for the production of basic chemical compounds. Pt. 3, 8:23851 (R;DE;In German)
Potential of organic residues for the production of basic chemical compounds, 8:23852 (R;DE;In German)
Giesen, B., Commissioning tests for the TEXTOR toroidal field power supply system, 8:25063 (J;US)
See Lisser, J., 8:25062
Giglioli, G., *See* Angelino, G., 8:23865
Gilai, D., *See* Williams, M.L., 8:23548
Gilbert, D.M., *See* Braid, T.H., 8:23587
Gilbert, E.S., *See* Marks, S., 8:24391
Gilbert, J.S., *See* Fowler, T.B., 8:23468
Gilbert, W., *See* Taylor, C., 8:24117
Gill, J.S., *See* Adler, H.I., 8:24380
Gill, S.P., *See* Baum, D.W., 8:23763
Gilligan, J.G., *See* Fang, Q.T., 8:25080
See Olson, R.E., 8:24940
Gillins, R.L., *See* Braid, T.H., 8:23587
Gilman, J., *See* Childs, W., 8:23465
Gimmy, K.L., Automatic diagnosis of multiple alarms for reactor control rooms, 8:23639 (J;US)
Ginnever, R.C., *See* Davies, B.E., 8:24260
Girard, B., Production of hydrogen by electrolysis of water under at medium temperature. Final report, 8:23205 (R;XE)
Gitman, G.M., Oxy-fuel burner development program. Final report Jul 81-May 82, 8:24154 (R;US)
Glad, A.S., Computer control and data acquisition for neutral-beam injectors, 8:24829 (R;US)
Glasgow, L.E., Emergency core cooling system, 8:23521 (P;US)
Glasow, R., *See* Gaul, G., 8:24666
Glass, A.M., *See* Liminga, R., 8:24040
Glatz, E., *See* Dauber, E., 8:23849
Gledhill, B.L., *See* Pinkel, D., 8:24327
Glicksman, M.E., *See* Ashok, S., 8:23916
Glock, E., *See* Engelhardt, W., 8:24863
See Vernickel, H., 8:24859
Gloel, J., 10 kW - solar power station and power plant optimizing, 8:23298 (R;DE;In German)
Glover, P.L., *See* Perkins, E.H., 8:24386, 8:24448
Goblirsch, G.M., Review of low-rank-coal AFBC testing, 8:22996 (R;US)
Godwin, R.O., *See* Simmons, W.W., 8:25140
Godwin, R.P., *See* Carlson, R.L., 8:24915
Goedheer, W.J., *See* Potters, J.H.H.M., 8:24837

Goetz, J., Analysis of radiation exposure for troop observers, Exercise Desert Rock VI, Operation Teapot. Final report 1 Mar-15 Jul 80, 8:24359 (R;US)
See Frank, G., 8:24360
Gohar, Y., INTOR radiation shielding for personnel access, 8:25175 (J;US)
See Evans, K. Jr., 8:24817
See Mattas, R.F., 8:25174
Golay, M., DRIFT; cooling tower drift eliminator analysis, 8:23399 (R;US)
Golay, M.W., TDIST2; community energy consumption analysis, 8:23872 (R;US)
Goldberg, A., Effect of geometric deformation of tetrahedral bonding on the vibrational properties of Group-IV semiconductors: Si in the BC-8 structure, 8:24037 (J;US)
Goldberg, D.A., *See* Cooper, W.S., 8:25084
Goldberg, F.F., *See* Vesely, W.E., 8:25236
Goldberg, I., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Goldburg, A., DOE, Gary testing tertiary polymer technique, 8:23026 (J;US)
Goldfinger, R.C., *See* Kritz, A.H., 8:24767
Goldman, A., *See* Gallagher, J., 8:24302
Goldman, S.R., Some nonlinear estimates for lateral propagation of self-generated B fields, 8:24764 (R;US)
Goldman, T., Grand unified particle physics and a high-intensity intermediate energy machine, 8:24608 (RA;US)
Goldring, G., *See* Bertschat, H.H., 8:23957
Goldschmidt, V.W., Effects of cyclic response of residential air conditioners on seasonal performance, 8:23840 (J;US)
Goldstein, G.R., Polarization structure of reactions at theta/sub C.M./ = π/2, 8:24637 (R;US)
Goldston, R., *See* Fonck, R.J., 8:24864
Goldston, R.J., Effects of toroidal field ripple on suprathermal ions in tokamak plasmas, 8:24803 (J;GB)
Goldwire, H.C. Jr., *See* Koopman, R.P., 8:23069
Gomay, Y., All TiC coated limiter experiment in the JIPP T-II tokamak, 8:24860 (J;NL)
Thermal and mechanical testings of TiC and TiN coating materials with Mo substrates, 8:25162 (J;US)
See Sukenobu, S., 8:24909
Gomez Saenz-Messia, J., Optimum conditions (technical and economic) for steel industry coke, 8:22932 (R;MX;In Spanish)
Gonano, L., Evaluation of alternative shaft-sinking techniques for high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 3), June 1981-July 1982, 8:23150 (R;US)
See Gates, R., 8:23151
See Roberds, W., 8:23153, 8:23154
Gooch, P.C., *See* Preston, R.J., 8:24376
Goodall, D.H.J., *See* McCracken, G.M., 8:24887
Goodman, J.P., Electrical system waveform distortion, 8:23822 (RA;US)
Gordinier, M.R., *See* Uckan, N.A., 8:25031
Gordon, A.S., Definitive studies on pole-top resuscitation. Final report, 8:24481 (R;US)
Gordon, E., *See* Der, Z.A., 8:24494
Gordon, H.A., Radioactively induced noise in gas-sampling uranium calorimeters, 8:24195 (R;US)
Gordon, R.J., *See* Presser, N., 8:24547
Gorker, G.E., Mechanical configuration and shielding for FED fuel injectors and diagnostic instrumentation, 8:24962 (J;US)
See Bronner, G., 8:25071
Gossenberger, M., *See* Ebersbach, K.F., 8:23848
Goswami, D.Y., *See* Klett, D.E., 8:23252
Gould, L.C., *See* Walker, C.A., 8:23177
Goulden, A.M., Nuclear reactors built, being built, or planned in the Unites States as of June 30, 1981, 8:23443 (R;US)
Goulianos, K., *See* Chapin, T.J., 8:24196
Grabinsky, G., *See* Sanger, P.A., 8:25049
Grabisch, K., *See* Bader, A., 8:24177
See Bohne, W., 8:24663, 8:24675, 8:24687
See Kovar, D.G., 8:24659, 8:24661
See Lehr, H., 8:24668
See Morgenstern, H., 8:24662
Gracheva, L.M., Genetic effects of the decay of radionuclides in cells, 8:24396 (TG;US)
Grady, J.K., Facility for radiographic diagnosis, 8:24346 (P;DE;In German)
Graeber, P., *See* Witt, H.T., 8:24479
Graef, H., Observation of a decrease in the g-factors of sup(156,160)Gd at high spins, 8:24688 (RA;DE;In German, English)
Graham, J., *See* Ferguson, D., 8:23591
Gran, R., *See* Firestone, M.A., 8:25101
Grathwohl, G., High temperature properties of Si_3N_4, 8:23994 (R;DE;In German)
Graumann, D.W., *See* Puhn, F.A., 8:25008
Grave, B., 20 kW-fuel cell units of compact assembly. Pt. 5, 8:23788 (R;DE;In German)
Gravenhorst, G., *See* Bottger, A., 8:24239
Gravitis, I., *See* Novotney, L.C., 8:24480
Grawe, H., Gamma ray spectroscopy in ^{78}Sr and ^{82}Zr, 8:24669 (RA;DE;In German)
Halflife and decay of ^{78}Sr, 8:24670 (RA;DE;In German)
See Alber, D., 8:24676
See Berger, A., 8:24677
See Bergmeister, F.J., 8:24665
See Decman, D.J., 8:24698, 8:24699
See Graef, H., 8:24688
See Haas, H., 8:23959
See Stenzel, C., 8:24697
Gray, W.H., Comparison between experimental and analytical winding prestrain for a circular solenoid, 8:25017 (J;US)
On mechanical stresses in solenoids constructed of transversely isotropic materials, 8:25002 (J;US)
See Ballou, J.K., 8:24125
See Shen, S.S., 8:25014
Grearson, P.D., *See* Besen, P.D., 8:25193
Greebler, P., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Green, D.W., Vapor pressures and vapor compositions in equilibrium with hypostoichiometric plutonium dioxide at high temperatures, 8:24001 (R;US)
Green, L.M., ICOP; financial model industrial cogeneration, 8:23406 (R;US)
Green, M.A., Modeling the cooldown of force cooled coils, 8:24121 (J;US)
Quench protection and design of large high current density superconducting magnets, 8:24122 (J;US)
See Eberhard, P.H., 8:24123
Green, T.A., Semiclassical trajectory effects on C^{6+}-H charge-exchange cross sections at low energy, 8:24556 (J;US)
Greene, M., *See* Freeman, R., 8:23494
Greene, N.M., BONAMI-S: response self-shielding by the Bondarenko method. Volume 2. Functional studies, 8:23543 (R;US)
Greene, S.R., PICES; utility static generation reliability, 8:23401 (R;US)
Greengard, P., Effects of electromagnetic radiation on calcium in the brain. Technical report, 8:24477 (R;US)
Greenlees, G., *See* Lewis, D., 8:24174
Greenough, N.L., High voltage rf coaxial vacuum bushing design considerations, 8:25095 (J;US)
Greenspan, E., *See* Olson, R.E., 8:24940
See Zediker, M.S., 8:25154
Gregor, H.D., *See* Schaerer, B., 8:24240
Gregorio, S.B., Comprehensive low-level waste management plan for the state of Kentucky. Fifth quarterly report for the period ending December 31, 1982, 8:23121 (R;US)
Gregory, B.C., *See* Boucher, C., 8:24862
Gregory, D., Solar-energy-system performance evaluation. Concord Light Plant municipal garage and office building, Concord, Massachusetts, November 1978-March 1979, 8:23348 (R;US)
Gregory, E., *See* Sanger, P.A., 8:25049
Gregory, W.S., *See* Fowler, T.B., 8:24089
Greig, J.R., *See* Murphy, D.P., 8:25153
Grell, R.F., Drosophila cytology and genetics, 8:24329 (RA;US)
Gresham, J.B., *See* Doane, J.W., 8:23292
Grewing, C.O., *See* Mattas, R.F., 8:25174
Gribble, R.F., *See* Schoenberg, K.F., 8:24811
Grieman, F.J., A $^4\Sigma^-$—X ^{3}Pi transition in CF: A measurement of the term energy and bond length of a fluoromethylidyne metastable, 8:24548 (J;US)
Laser-induced fluorescence of trapped molecular ions: the CH^+ $A^1\pi$ - $X^1\Sigma^+$ system, 8:24565 (J;GB)
Griffith, J.K., *See* Mapel, W.J., 8:22966
Griffith, S.K., Foreign applications and export potential for wind-energy systems, 8:23761 (R;US)
Grimm, R., *See* Izzo, R., 8:24768
Grisham, D.L., *See* Lambert, J.E., 8:24192
Gritton, D.G., Laser sequencing, synchronization, and safety systems, 8:25150 (J;US)
See Whitham, K., 8:25143, 8:25144
Grogan, P.J., Economic evaluation of competing industrial waste-heat-recovery technologies, 8:23856 (R;US)
See Baker, J.E., 8:23696

See Garvey, D.B., 8:23700
Grogger, G.M., *See* Carder, J.H., 8:25247
Grosman, A., *See* Samain, A., 8:24871
Gross, D.H.E., Cluster transfer in damped collisions between heavy ions, 8:24707 (RA;DE;In German, English)
Interplay between coherent and stochastic effects in deep inelastic collisions of heavy ions, 8:24708 (RA;DE;In German, English)
Mass-yield distribution in proton and heavy-ion induced target fragmentation processes, 8:24691 (RA;DE;In German, English)
Surface friction model of deep inelastic collisions and capture, 8:24706 (RA;DE;In German, English)
See Froebrich, P., 8:24673
Grossman, E., *See* Eberhard, P.H., 8:24123
Grotz, G.F., *See* Greenough, N.L., 8:25095
Grotz, S.P., Thermal design considerations of shields for levitated coils, 8:25024 (J;US)
See Pontau, A.E., 8:24854
Groveman, B., *See* Griffith, S.K., 8:23761
Gruber, E.E., *See* Kramer, J.M., 8:23589
Gruber, G., Observation of the recoil effect on the K-shell excitation probabilities in ion-atom collisions, 8:24543 (RA;DE;In German)
Gruen, D.M., Getting metal-hydrides to do what you want them to, 8:23215 (R;US)
Materials engineering of metal hydrides, 8:23216 (R;US)
Static-mode laser-fluorescence spectroscopy: a new technique for studying excitation mechanisms in particle-surface collisions, 8:24521 (R;US)
Surface segregation in binary alloy first wall candidate materials, 8:24904 (J;NL)
See DeWald, A.B., 8:24877
See Krauss, A.R., 8:24967
See Mendelsohn, M.H., 8:23214
See Pellin, M.J., 8:24812
Gruene, H., 20 kW fuel cell units of compact design. Pt. 1, 2, 8:23785 (R;DE;In German)
Grunes, H., Development of an advanced solar augmented water heater. Final report Feb 80-May 82, 8:23324 (R;US)
Gruszczynski, M.J., Heat transfer to water from a vertical tube bundle under natural-circulation conditions, 8:23635 (R;US)
Guarnieri, M., *See* Fellin, L., 8:25218
Gudin, C., Recherche d'une biotechnologie solaire basee sur la culture continue de cellules photosynthetiques (Research on a solar biotechnology based on the continuous culture in photosynthetic cells). Final report, 8:23276 (R;US)
Solar biotechnology: microalgae production in tubular photoreactors for energy and chemicals, 8:23260 (R;FR)
Guertin, R.P., *See* Torikachvili, M.S., 8:24041
Guinn, G.M., *See* Russell, L.B., 8:24426
See Russell, W.L., 8:24422
Guldmann, J.M., Marginal-cost pricing for gas distribution utilities: further analyses and models, 8:23065 (R;US)
Gundlach, E.R., Persistance of Metula oil in the Strait of Magellan six and one-half years after the incident. Final report, 8:23041 (R;US)
Guntau, A., Reducing the basic emission of methane by advance drainage, 8:22969 (R;DE;In German)
Gunther, W.H., *See* Stein, R.P., 8:23595
Gupta, Y., *See* McHugh, S., 8:23611
Gur, Y., *See* Kaplan, M.P., 8:23843
Guralnik, G.S., *See* Bender, C.M., 8:24633
Gureghian, A.B., Mathematical model for evaluating the suitability of a low-level radioactive waste site, 8:23119 (R;US)
Gurr, H.S., *See* Pasierb, E.L., 8:24586
Guttman, L., Self-consistent electronic structure of realistic models of amorphous hydrogenated silicon, 8:24039 (J;US)
Guttormsen, M., *See* Agarwal, Y.K., 8:24689
Guzdar, P.N., Ion-temperature-gradient instability in toroidal plasmas, 8:24779 (J;US)
See Drake, J.F., 8:24777
Gwaltney, R.C., CURT2; curved tubes or elbows & attached pipes, 8:24084 (R;US)
Gyorke, D.F., *See* Yeh, J.T., 8:23428

H

Haag, M., Attempting a forecast on the future occurence of pollutants in food on the basis of today's and future production figures and patterns of application of chemicals, 8:24262 (R;DE;In German)
Haange, R., Design of calorimeter and ion dump for JET neutral injection beam line, 8:25111 (J;US)
Haas, D., *See* Bairiot, H., 8:23453
Haas, G., *See* Engelhardt, W., 8:24863
See Murphy, M., 8:25120
Haas, H., Hyperfine field at ^{22}Na in nickel, 8:23959 (RA;DE;In German)
See Bergmeister, F.J., 8:24665
See Bertschat, H.H., 8:23958, 8:23960
See Devare, H.G., 8:23956
See Grawe, H., 8:24669, 8:24670
See Stenzel, C., 8:24697
Haas, S.M., *See* Boyd, D.W., 8:23390
Haasz, A.A., *See* Auciello, O., 8:25163
Haberzettl, H., *See* Cravo, E., 8:24749
Hackbarth, H., *See* Frisius, F., 8:23990
Hackenburg, R., *See* Hungerford, E.V., 8:24595
Hackett, P.L., *See* Kelman, B.J., 8:24394
Hackley, D.S., Engineering, testing and manufacturing the general dynamics test coil for the Large Coil Program - an update, 8:25045 (J;US)
General Dynamics superconducting magnet for the Large Coil Program: a progress report, 8:24119 (J;US)
Hadden, C.T., *See* Billen, D., 8:24381
Hadley, D.M., *See* Mellman, G.R., 8:24221
Haesselbarth, R., *See* Arndt, P., 8:24161
Haeusser, O., *See* Graef, H., 8:24688
Hafizi, B., *See* Tsang, K.T., 8:24774
Hagen, W.F., *See* Simmons, W.W., 8:25140
Haglund, R.F. Jr., *See* Carlson, R.L., 8:24915
Hahn, A., Grenoble neutrino experiment, 8:24585 (RA;US)
Hahn, R., Investigations on the improvement of activated alumina adsorbents, 8:24060 (R;DE;In German)
Haines, J.R., *See* Fuller, G.M., 8:24961
Hakoda, K., *See* Kiyama, H., 8:25205
Hale, G.M., *See* Harris, D.R., 8:24758
Hall, G.V., *See* Revis, N., 8:24447
Hall, I.W., Stem observation of crystallization in thin films of amorphous Fe/sub 40/Ni/sub 40/P/sub 14/B/sub 6/, 8:23984 (J;US)
Hall, J.C., Studies leading to the development of high-rate lithium-sulfuryl chloride battery technology. Quarterly report No. 3, 1 Apr-30 Jun 82, 8:23668 (R;US)
Hall, M.R., Flat plate photovoltaic power systems: description, design and cost. Summary report, 8:23290 (R;US)
Halle, H., DOE/ANL/HTRI heat-exchanger-tube vibration data bank, 8:23846 (R;US)
Halling, H., *See* Bohn, F.H., 8:25176
Hallquist, J.O., NIKE2D: a vectorized, implicit, finite-deformation, finite-element code for analyzing the static and dynamic response of 2-D solids, 8:24143 (R;US)
Halonen, L., Local mode predictions for excited stretching vibrational states of HCCD and H ^{12}C ^{13}CH, 8:24552 (J;US)
Halstead, W.J., Energy involved in construction materials and procedures, 8:23844 (R;US)
Hamada, Y., Analysis of external hybrid poloidal coil system, 8:24994 (J;US)
Hamaker, H.C., *See* Brodsky, M.B., 8:23944
Hamel, B.B., *See* Grogan, P.J., 8:23856
Hamil, R., *See* Buttram, M., 8:24186
Hamill, W.H., Temperature dependence of dispersive hopping transport and diffusion in disordered solids, 8:24067 (J;GB)
Hamilton, H.B., Development of a dc current limiting interrupting system for mines. Open file report Jun 79-Sep 81, 8:24109 (R;US)
Hamilton, W.C., Manufacture of 16,000 amp superconducting conductor for the tokamak toroidal field coil program, 8:25019 (J;US)
Hamm, R.W., Use of the radio-frequency quadrupole structure as a cyclotron axial-buncher system, 8:24168 (R;US)
Hammad, F.H., Oxidation-induced dimensional changes in zircaloy cladding tubes, 8:23921 (RA;US)
Hammond, R.P., Engineering challenges of underground contained fusion, 8:24938 (J;US)
Hampel, V.E., *See* Koponen, B.L., 8:23544, 8:23545
Hampton, N.L., *See* Laats, E.T., 8:23446
Hamshar, J.A., *See* Fling, W.A., 8:22903
Hand, R.E. Jr., *See* Mullaney, P.F., 8:24450
Hanks, D., *See* Hardy, L.C., 8:23099
Hanlon, J.A., *See* Carlson, R.L., 8:24915
Hannerz, K., Towards intrinsically safe light-water reactors, 8:23637 (R;US)
Hannon, B., Marginal energy cost of goods and services. Final report, 8:23037 (R;US)
Hansel, J.N., *See* Hardy, L.C., 8:23100

Hansen, D.J., *See* Cowles, C.J., 8:24290
Hansen, F.R., Economies of scale in the production of steam with solar thermal-fossil boiler hybrid systems, 8:23253 (R;US)
Hansen, O., *See* Christensen, P.R., 8:24690
Hansen, S.M., Chemical feedstocks from wood: aqueous organic alcohol treatment, 8:23263 (R;US)
Hansmann, D.D., *See* Anderson, M.A., 8:24279
Hanson, D.A., *See* Baker, J.E., 8:23696
Hanson, K.M., *See* Sandrik, J.M., 8:24210
Harbec, G., Power supplies for the Varennes tokamak a quasi-continuous operation experiment, 8:25065 (J;US)
Harden, M.J., *See* Witschi, H.R., 8:24442
Hardie, R.W., BICYCLE; levelized life cycle cost calculation, 8:23404 (R;US)
Hardy, H.A., *See* Scofield, N.R., 8:23628
Hardy, L.C., Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R;US)
See Shettel, D.L. Jr., 8:23098
Hargrove, C.K., Rare decays of pions & muons: a review, 8:24581 (RA;US)
Harker, A.B., *See* Jantzen, C.M., 8:23134, 8:23181
Harker, Y., *See* Homeyer, W.G., 8:24980
Harmon, K.M., *See* Lakey, L.T., 8:23163
Harper, H.A., *See* Braid, T.H., 8:23587
Harper, R., TRAC-PD2/MOD1; best-estimate analysis PWR LOCA, 8:23585 (R;US)
Harrer, B.J., *See* Moore, E.B. Jr., 8:23717
Harriman, A., The photochemical dissociation of water by means of visible light, 8:23210 (R;US)
Harris, D.R., ALVIN; differential-integral data consistency, 8:24639 (R;US)
STEEP4; thermonuclear reaction rates, 8:24758 (R;US)
Harris, H.W., *See* Brower, D., 8:25027
See Wildi, P., 8:25028
Harris, R., Fuel management schemes for PWR extended burnup fuel cycles with gadolinium, 8:23493 (RA;US)
Harris, W., *See* Brower, D., 8:24944
Harrison, F.L., Effects of copper speciation on aquatic ecosystems, 8:23429 (R;US)
Harrison, J.L., *See* Newman, L.W., 8:23492
Harrison, R.F., *See* Blair, C.K., 8:23373
Hart, R.S., *See* Mellman, G.R., 8:24221
Harte, J.R., Visual-response indicator for bar-code-reader input. Final report, 8:25265 (R;US)
Hartman, A.E., *See* Morgan, G.D., 8:24956
Hartman, F.C., Protein chemistry and enzyme mechanisms, 8:24320 (RA;US)
Hartmann, K.H., Partial coherence in heavy-ion reactions, 8:24710 (RA;DE;In German, English)
Hartmann, K.M., *See* Gross, D.H.E., 8:24707
Hartt, W.H., Fatigue of welded structural steel in sea water, 8:23905 (RA;US)
Hartung, Heliostat field layout for solar thermal power plants, 8:23304 (R;US)
Hartwig, K.T., Soldering studies of an aluminum stabilized superconductor, 8:25048 (J;US)
Harvey, A.R., Analysis and design of short, iron-free dipole magnets, 8:25222 (J;US)
Harvey, C.O., *See* Westsik, J.H. Jr., 8:23159
Haschek, W.M., *See* Witschi, H.R., 8:24442
Hass, H., *See* Alber, D., 8:24676
Hass, M., *See* Bertschat, H.H., 8:23957
Hassan, A.M., Analytical applications of neutron capture gamma-ray spectroscopy, 8:24049 (R;DE)
Hassanein, A.M., Dynamics of melting, evaporation, and resolidification of materials exposed to plasma disruptions, 8:24893 (J;NL)
See Peterson, R.R., 8:25138
See Wolfer, W.G., 8:24894
Hassberger, J.A., Preliminary assessment of interactions between the FMIT deuteron beam and liquid-lithium target, 8:24831 (R;US)
Hasse, A., *See* Schaerer, B., 8:24240
Hasselman, D.P.H., *See* Bentsen, L.D., 8:24016
Hassenzahl, W., *See* Taylor, C., 8:24117
Haste, G.R., *See* Hillis, D.L., 8:24790
Hasti, D.E., *See* Prestwich, K.R., 8:24185
Hata, M., *See* Shimizu, M., 8:24927
Hatakeyama, T., *See* Suzuki, Y., 8:25177
Hatfield, S.C., *See* Andrews, M.G., 8:23474
Haubenberger, W.D., Bitter-type magnet plate design with compound conductor of ultrahigh mechanical strength, 8:25003 (J;US)
Haug, N., *See* Schaerer, B., 8:24240
Haumann, J.R., IPNS distributed-processing data-acquisition system, 8:24173 (R;US)
See Crawford, R.K., 8:24172
Hauser, G.C., Stored-data acquisition system, 8:25278 (R;US)
Hauser, S.G., *See* Kreid, D.K., 8:24110
Hayashi, S., *See* Endo, M., 8:24146
Hayden, N.K., *See* McArthur, D.A., 8:23649
Hayes, R.L., *See* Coffey, J.L., 8:24404
Haynes, D.L., *See* Walls, A.A., 8:24191
Haynes, W.P., Pilot-plant study of an adiabatic parallel-plate methanation reactor, 8:23220 (R;US)
Synthesis of liquids and pipeline gas by Fischer-Tropsch, 8:23221 (R;US)
See Schehl, R.R., 8:23218
Hazak, G., Integral representation for geometric optics solutions, 8:24781 (J;US)
Hazeltine, R.D., *See* Mahajan, S.M., 8:24782
He, G.Z., *See* Kwok, H.S., 8:24562
Heagle, A.S., *See* Heck, W.W., 8:24403
Healzer, J.M., NATBWR: a steady-state model for natural circulation in boiling-water reactors, 8:23612 (R;US)
Hearl, W., *See* Jacobson, K.B., 8:24412
Heartlein, M.W., *See* Preston, R.J., 8:24376
Heath, C.E., *See* Den Hartog, P.K., 8:24159
Heatherly, L., *See* Clausing, R.E., 8:24899
Heck, W.W., Ozone impacts on the productivity of selected crops, 8:24403 (R;US)
Heckermann, H., *See* Wolff, U., 8:23480
Heese, R.N., Shielded beam channel septum magnet, 8:24193 (J;US)
Heffler, J., *See* Boehm, H., 8:23783
Heffner, R.H., Proceedings of the workshop on muon science and facilities at Los Alamos, 8:24545 (R;US)
Heger, N., *See* Imhausen, K.H., 8:22914
Heidersbach, R., *See* Keiser, J., 8:23900
See Lynch, P., 8:23901
Heidinger, G., *See* Leibbrand, W., 8:23430
Heidtmann, U., *See* Birnbreier, H., 8:23357
See Reiss, H., 8:23313
Heifetz, D., Pumping and erosion rates for the TFTR and INTOR/FED limiter designs, 8:24856 (J;NL)
See Petravic, M., 8:24855
See Post, D.E., 8:24868
See Prinja, A.K., 8:24853
Heifetz, D.B., *See* Smith, D.L., 8:25172
Heiken, G., Textural analysis of tephra from a rhyodacitic eruption sequence, Thira (Santorini), Greece, 8:24490 (R;US)
See Broxton, D., 8:24485
Heikhaus, H.H., Study of the effect that building insulation has on the actual fuel consumption. Final report, 8:23322 (R;XE;FR)
Heinz, T.F., *See* Tom, H.W.K., 8:24069
Heinze, D.M., Mineralogy and petrology aspects of Mesaverde Formation at Rifle Gap, Colorado, specific to the sedimentology and gas-bearing intervals in the subsurface, 8:23060 (R;US)
Heising, C.D., *See* Burke, R.P., 8:23574
Heisler, M.P., SOMIX1; sodium spray fires in cylindrical cell, 8:23508 (R;US)
Heit, M., Trace element and polycyclic aromatic hydrocarbon levels in sediment cores from Sagamore and Woods Lakes, 8:24288 (RA;US)
See Galloway, J.N., 8:24286
Heitzenroeder, P.J., Engineering design and construction of the S-1 spheromak coil systems, 8:25034 (J;US)
Helgesen, H., JET ohmic heating circuit, 8:25061 (J;US)
Heller, L., *See* Aerts, A.T., 8:24614
Hellwig, R.J., *See* Niyogi, S.K., 8:24313
Hellwig, T.M., Thermal performance of EBT-P vacuum concepts, 8:24923 (J;US)
Helmich, C., DOECTZDATA; California sixteen-zone weather data, 8:25223 (R;US)
Helmich, R.C., *See* Heitzenroeder, P.J., 8:25034
Helton, F.J., *See* Lee, J.K., 8:24786
Hemmerich, J.L., Conductance thermal accommodation and beaming from neutralizer gas-cells, 8:25087 (J;US)
Henderson, J.S., *See* Burns, R.E., 8:23536
Henderson, J.T., Application of QA to geoscience investigations, 8:24482 (J;US)
Hendewerk, M., *See* Leygraf, Ch., 8:23211
Hendrey, G.R., *See* Francis, A.J., 8:24284
See Galloway, J.N., 8:24285
Hendricks, R.W., *See* Koehler, W.C., 8:24732
Hendrickson, P.L., *See* Moore, E.B. Jr., 8:23717

Hendrix, T.R., The radiographic examination of the colon, 8:24344 (R;US)
Henley, E.M., Recent results and physics at a future high intensity facility of E ≦ 31 GeV, 8:24600 (RA;US)
Hennemann, B., *See* Stall, J., 8:23358
Hennion, F., *See* Breton, J., 8:25192
Henry, P.R., *See* Pearl, D.S., 8:24470
Henry, R.F., Electrostatically augmented gas-cleanup devices for particular removal, 8:22947 (R;US)
Henry, W.M., Inorganic compound identificatioon of fly ash emissions from municipal incinerators. Final report, 8:24051 (R;US)
Hensley, W.K., *See* Shettel, D.L. Jr., 8:23098
Hentschel, J., Geological and geotechnical studies for the construction of pilot caverns in rock for the storage of crude oil, hydrocarbon products and LPG, 8:23045 (R;DE;In German)
Herbert, R., *See* Tylka, J.P., 8:23593
Herczeg, P., Muon number violating kaon decays, 8:24607 (RA;US)
Heremans, R., *See* Casteels, F., 8:23145
Hering, W., *See* Duennweber, W., 8:24654
Herman, H., Initial progress in the first wall, blanket and shield engineering test program for magnetically confined fusion power reactors, 8:24969 (J;US)
Hermann, R., *See* Beck, H.P., 8:23431
Hermeking, H., *See* Doenitz, W., 8:23203
Herms, C.D., Development of a methane measuring equipment for several measuring points, 8:23008 (R;DE;In German)
Herndon, C.S., *See* Hartman, F.C., 8:24320
Herrmann, A.G., Composition of rocks - criteria for the conditioning of high-level radioactive wastes, 8:23140 (RA;DE;In German)
Herrmann, G., Are there superheavy atomic nuclei, 8:24705 (R;DE;In German)
Herrmannsfeldt, W.B., EGUN; calculation of electron trajectories, 8:24167 (R;US)
Herskind, B., *See* Lindenberger, K.H., 8:24678
Hertzberg, A., *See* Willenberg, H.J., 8:24973
Hespel, C., *See* Girard, B., 8:23205
Hesselgrave, D.H., Design and development of an electronic crowbar for the protection of HVDC neutral beam components, 8:25092 (J;US)
Hewison, R., *See* Cowking, C.B., 8:23590
Hibbs, S.M., *See* Pedrotti, L.R., 8:24845
Hickmon, T., *See* Mylroie, A.A., 8:24469
Hicks, B.B., Wet and dry surface deposition of air pollutants and their modeling, 8:24230 (R;US)
Hicks, J.N., *See* Rahman, H., 8:23063
Hidy, G.M., Precipitation-scavenging chemistry for sulfate and nitrate from the SURE and related data. Volume 2. Final report, 8:24224 (R;US)
Highland, V.L., Preliminary report on a new pion beta decay experiment, 8:24583 (RA;US)
Higuchi, S., *See* Redey, L., 8:23674
Hilal, M.A., Persistent resistive regions and cryogenic stability of composite conductors: effect of cooling spacers, 8:25042 (J;US)
See Eyssa, Y.M., 8:25030
See Turner, L.A., 8:23780
Hildebrand, K.D., *See* Bohne, W., 8:24687
See Froebrich, P., 8:24667
Hildebrandt, U.W., *See* Sahm, P.R., 8:23407
Hilger, E., Results from PETRA, 8:24575 (R;DE)
Hill, D.C., Accumulation of cadmium and zinc in soil and vegetation from long-term application of wastewater, 8:24475 (J;US)
Hill, D.J., *See* Tylka, J.P., 8:23593
Hill, G., *See* Mylroie, A.A., 8:24469
Hill, J.R., *See* Severyn, J.R., 8:25152
Hill, L.J., *See* Smith, V.K., 8:23695
Hill, M.D., *See* De Marsily, G., 8:23178
Hill, O.A. Jr., *See* Strain, W.H., 8:24463
Hill, T.R., TIMEX; 1-dimensional time-dependent multigroups discrete ordinates, 8:24717 (R;US)
Hilliard, R.K., Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5, 8:23617 (R;US)
Hillis, D.L., Electron confinement studies on the EBT-S Bumpy Torus Experiment using soft x-ray techniques, 8:24790 (J;US)
Hillmann, H., *See* Braginski, A.I., 8:24128
Hillstrom, K.E., OPTIMIZERS; nonlinear optimization subroutines, 8:25252 (R;US)
Hilscher, D., Neutron emission in the reaction $^{165}Ho + {}^{20}Ne$, 8:24684 (RA;DE;In German, English)
See Birkelund, J.R., 8:24686
See Ingold, G., 8:24198
See Jahnke, U., 8:24664
See Kovar, D.G., 8:24661
See Wilcke, W.W., 8:24685
Hinks, D.G., *See* Behroozi, F., 8:24002
See Sinha, S.K., 8:23996
Hinz, A.F., *See* Bell, H.H. Jr., 8:25170
Hippler, R., *See* Wille, U., 8:24535
Hirano, Y., *See* Shimada, T., 8:24948
Hiraoka, T., *See* Kasai, M., 8:24935
Hirsch, J.J., DOE2.1A; building energy consumption analysis, 8:23794 (R;US)
Hirschfeld, D., *See* Kupka, K.H., 8:23847
Hirschfeld, T., *See* Klainer, S.M., 8:24294
Hirshfeld, D.S., Future world oil prices: review of current forecasts, identification of price-determining factors, and delineation of a quantitative framework for analysis, 8:23035 (R;US)
Hirst, E., Energy use guidelines for public/nonprofit buildings, 8:23829 (J;US)
Hitchcock, D.A., *See* Mahajan, S.M., 8:24782
Hitterman, R.L., *See* Crawford, R.K., 8:24172
Hively, L.M., Optimal neutral beam heating scenario for FED, 8:24814 (J;US)
Hiyama, T., *See* Shimamoto, S., 8:25053, 8:25056
Ho, K., *See* Liu, S.H., 8:23979
Ho, T., *See* Preston, R.J., 8:24376
Ho, T.S., Differential cross section for electron capture in fast ion-atom collisions, 8:24528 (RA;DE;In German)
See Eichler, J., 8:24532
Hobbins, R.R., *See* Mason, R.E., 8:23496
Hodge, P.E., *See* Furman, E.R., 8:23415
Hodge, W.L., *See* Stratton, B.C., 8:24770
Hodges, L.T., Correlation of surficial geologic anomalies with gas production, Cottageville Field, West Virginia, 8:23055 (R;US)
Hodson, R.E., *See* Azam, F., 8:24273
Hoehne, K., *See* Gruene, H., 8:23785
Hoenig, M.O., *See* Shanfield, S.R., 8:24124
Hoffman, A.L., *See* Willenberg, H.J., 8:24952
Hoffman, C.M., Search for muon number violation at LAMPF, 8:24599 (RA;US)
Hoffman, D.K., *See* Evans, J.W., 8:24065, 8:24638
Hoffman, M.A., Liquid jet experiments: relevance to inertial confinement fusion reactors, 8:25156 (J;US)
Hoffmann, H., Economics of extended burnup from a utility point of view, 8:23532 (RA;US)
See Wolff, U., 8:23480
Hoffmann, K., *See* Chakraborty, B., 8:23939
See Fluss, M.J., 8:23942
Hoffmann, R., Target thickness and density effects for inner shell excitation in near symmetric collision-systems, 8:24544 (RA;DE;In German)
Hofman, R.J., *See* Eberhardt, L.L., 8:24271
Hogan, J.T., Calculation of hydrogen density in toroidal plasma, 8:24793 (J;NL)
Hohmann, G.W., *See* Killpack, T.J., 8:23367
Hoke, D.E., *See* Donaldson, A., 8:23021
Holland, D.M.P., *See* Parr, A.C., 8:24209, 8:24519
Holland, J.M., Dermal Pathology Program, 8:24446 (RA;US)
Holloway, F.W., *See* Suski, G.J., 8:25151
Holloway, R., *See* Whitham, K., 8:25143, 8:25144
Hollowell, C.D., *See* Berk, J.V., 8:23832
Hollowell, T.E., International over-ramp project at Studsvik, 8:23483 (RA;US)
Holman, H.Y., *See* Liu, M.K., 8:24225
Holmes, D.L., *See* Hall, M.R., 8:23290
Holte, H.O., Comparative report of solar heating system performance, 8:23349 (J;US)
Holtmann, H.D., Yield of the oxidation of very rarefied propane/air mixtures in catalytic fluidized beds, 8:24571 (R;DE;In German)
Holtz, M., *See* Frey, D., 8:23326
Holub, E., *See* Hilscher, D., 8:24684
See Ingold, G., 8:24198
See Jahnke, U., 8:24664
Holz, D., Connection between air permeability of joints of windows and exchange of air in the room, 8:23801 (R;DE;In German)
Holzer, R., Design and development of KWU 18 x 18 PWR and 9 x 9 BWR fuel assemblies and their relevance to burnup increase, 8:23459 (RA;US)
Holzrichter, J.F., *See* Simmons, W.W., 8:25140
Homeyer, H., Evidence for non-sequential emission of fast α-particles in deep-inelastic $^{20}Ne + {}^{197}Au$ collisions at 14.5 MeV/nucleon, 8:24694 (RA;DE;In German, English)

See Buergel, M., 8:24693, 8:24696
See Duennweber, W., 8:24654
See Egelhaaf, C., 8:24653
See Gamp, A., 8:24695
See Kovar, D.G., 8:24659, 8:24661
See Rauch, W., 8:24660, 8:24714
Homeyer, W.G., Design of a lithium blanket module for testing in the TFTR, 8:24980 (J;US)
Hommert, P.J., Oil-shale Program. Twenty-sixth quarterly report, April 1982-June 1982, 8:23082 (R;US)
Honigsberg, C.A., Sealing arrangement with annular flexible disc, 8:23520 (P;US)
Hooper, E.B., *See* Pedrotti, L.R., 8:24845
Hooper, R.J., Structural design procedures for FED magnets, 8:25035 (J;US)
Hoover, A.D., *See* Wilcke, W.W., 8:24685
Hopkins, D.B., *See* Cooper, W.S., 8:25084
Hopkins, G.C., *See* Brown, P.D., 8:23534
See Churlik, D.G., 8:23535
Hopkins, G.R., Prospects of low activation fusion reactor design, 8:24934 (J;US)
See Wong, C.P.C., 8:24977, 8:24978
Hopkins, G.W., Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report, 8:23501 (R;US)
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report, 8:23502 (R;US)
Thermal and hydraulic code verification: ATHOS2 and model boiler No. 2 data. Volume 3. Final report, 8:23503 (R;US)
Hopps, H.C., *See* Feder, G.L., 8:24299
Hora, M., *See* Ninomiya, M., 8:23133
Horiike, H., *See* Tanaka, S., 8:25109
Horn, F.L., An operating high temperature (1000°C) electrolysis demonstration unit, 8:23213 (J;US)
Hornstra, F., *See* Miller, J.F., 8:23676
Horowitz, G., *See* Bourrasse, A., 8:23262
Horowitz, J.S., Heat pump apparatus, 8:23360 (P;US)
Horrigan, S.G., *See* Eppley, R.W., 8:24272
Horst, T.W., Estimation of airborne and surface contamination resulting from the deposition-resuspension process, 8:24251 (J;GB)
Horton, W.H., *See* Carlson, D.D., 8:23629
Horton, Y., *See* Filler, R.S., 8:24441
Horvath, R.E., Selected papers from the energy workshop: industry perspectives on pioneer process plants, 8:23750 (R;US)
Horwitz, P., *See* Baron, S., 8:23558
Hosea, J.C., *See* Arunasalam, V., 8:24771
Hoshino, M., *See* Shiga, S., 8:23913
Hosoda, K., *See* Moriya, M., 8:24023
Hosogane, N., Design concept of real-time plasma control for JT-60, 8:25179 (J;US)
Hotchkiss, J.A., *See* Kennel, S.J., 8:24321
Houdaille, B., *See* Bruet, M., 8:23486
Houlberg, W.A., *See* Hively, L.M., 8:24814
Howard, J.B., *See* Longwell, J.P., 8:22902
Howe, H.C. Jr., Dependence of hydrogen recycling on molecular effects in tokamaks, 8:24872 (J;NL)
Howl, D.A., *See* Ainscough, J.B., 8:23489
Hoyer, M., The effect of oxidation on the microhardness and plastic properties of Guasare coal, 8:22942 (R;MX;In Spanish)
Hsiao, M.Y., *See* Fang, Q.T., 8:25080
Hsie, A.W., Mammalian cell genetic toxicology, 8:24416 (RA;US)
Hsin-Hsin Ho, *See* Drescher, B., 8:25272
Hsing, W.W., Superfast Z-pinch-produced plasmas, 8:24760 (R;US)
Hsu, W.L., Neutral gas blanket effects in a gaseous divertor, 8:24858 (J;NL)
Hsuan, H., *See* Arunasalam, V., 8:24771
See Kritz, A.H., 8:24767
Huang, A.H.L., *See* Kennel, S.J., 8:24321
Huang, J., *See* Canela, F., 8:23416
Huang, S., Effect of curing condition on the concrete moisture retention and its shielding implication for the design of fusion facilities, 8:24924 (J;US)
Huang, S.F., *See* Marchok, A.C., 8:24443
Huang, S.T., *See* Burke, R.J., 8:24979
Huang, Y., *See* Tobin, J.G., 8:23981
Huang, Y.C., *See* Wang, S.T., 8:24120
Huart, M., Design, fabrication and erection of flywheel-generator-convertors for the JET tokamak, 8:25060 (J;US)
Huba, J.D., *See* Drake, J.F., 8:24777
Hubbard, J.D., *See* Cowles, C.J., 8:24290
Hubbard, L.M., Multichannel distorted wave Born approximation for reactive scattering, 8:24549 (J;US)
Hubert, S., *See* Krupa, J.C., 8:23889
Huckins, R., Data collection system for a tokamak fusion experiment, 8:25169 (J;US)
Hucko, R.E., Application of HGMS in coal preparation, 8:22986 (R;US)
Hudson, C.L., Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R;US)
Hudson, R.J.M., *See* Chen, C.W., 8:24281
Huebel, H., *See* Agarwal, Y.K., 8:24689
Huerta, M., Study and full-scale test of a high-velocity grade-crossing simulated accident of a locomotive and a nuclear-spent-fuel shipping cask, 8:24111 (R;US)
Huey, R.J., *See* Cain, W.S., 8:23830
Hugenberger, R.E., *See* Bliss, E.S., 8:25146, 8:25147
Huggenberger, M., Helium-cooled, solid breeder blanket design for a tokamak fusion reactor, 8:24981 (J;US)
Hughes, J.E., Solar-energy-system performance evaluation: Montecito Pines apartment complex, Santa Rosa, California, November 1978-March 1979, 8:23335 (R;US)
Hughes, M.H., *See* Ashby, D.E.T., 8:24795
Hughes, V.W., Internal spin structure of the proton from high energy polarized e-p scattering, 8:24593 (RA;US)
Huguet, M., *See* Salpietro, E., 8:25032
Huizenga, J.R., *See* Birkelund, J.R., 8:24686
See Wilcke, W.W., 8:24685
Hull, J.R., *See* Lyczkowski, R.W., 8:23640
Hulstrom, R.L., *See* Bird, R.E., 8:23281
Humphreys, C.A., *See* Suski, G.J., 8:25151
Hungerford, E.V., Preliminary report on an experiment to observe Σ hypernuclei in the 1p shell nuclei, 8:24595 (RA;US)
Hunsicker, P.R., *See* Russell, W.L., 8:24421, 8:24422, 8:24423, 8:24424, 8:24425
Hunter, B.L., Magnet design for INTOR, 8:25039 (J;US)
See Hooper, R.J., 8:25035
See Turner, L.R., 8:25046
Hunter, K.C., *See* Robbins, C.L., 8:23827, 8:23828
Hunter, S.R., Anomalous electron-attachment properties of perfluoropropylene (1-C_3F_6) and their effect on the breakdown strength of this gas, 8:24523 (R;US)
Hurley, C.A., Nova mechanical systems, 8:25141 (J;US)
Hurst, G.S., *See* Payne, M.G., 8:24559
Hutchins, H.S., *See* Brower, D., 8:25027
See Nelin, K., 8:25026
See Terry, D.R., 8:25186
Hutchins, S., *See* Brower, D., 8:24944
Hutton, P.H., Fatigue-crack monitoring in-flight using acoustic emission - hardware, technique, and testing, 8:24142 (R;US)
Hwa, R.C., Implications of QCD for soft hadronic and nuclear processes, 8:24612 (RA;US)
Hwang, P.A., *See* Dalrymple, R.A., 8:23258
Hyman, J.M., MOL1D; partial differential equations solution, 8:25253 (R;US)

I

Iba, D., *See* Suzuki, Y., 8:25177
Ibe, A.P., *See* Canela, F., 8:23416
Ibrahim, E.A., *See* Singh, S.K., 8:25044
Ichikawa, M., Study of LWR fuel behavior by well characterized tests. Part I. Inpile measurement of cladding diametral deformation with burnup, 8:23454 (RA;US)
Ide, J., Development of an energy converter for the production of heat, mechanical and electrical energy through the gasificaton of wood and straw in a batch gasifier with an output of 50-150 kw. extended to include the gasification of batched biomass with an output of 150-400 kw. Final report, 8:23226 (R;US)
Idmtal, J., *See* Breton, J., 8:25192
Iijima, T., *See* Kajiura, S., 8:25212
Iiyoshi, A., *See* Nakashima, H., 8:24974
Ikeda, N., Engineering tests and performance of screw pinch device TPE-2, with non-circular cross-section, 8:24946 (J;US)
Ikegame, H., *See* Kobayashi, S., 8:25059
Ikuta, K., Tokamak-stellarator hybrid configurations with unlinked helical coils, 8:24832 (R;JP)
Illi, H., *See* Warnecke, E., 8:23139
Im, K.H., Heat transfer in slagging MHD radiant boilers, 8:23770 (R;US)
Iman, S.H., *See* Sasscer, D.S., 8:23310
Imanishi, B., *See* Liu, Q.K.K., 8:24645
Imarisio, G., Synopsis of results of the first programme on the production and utilization of hydrogen within the energy R+D programme of the Commission of the European Communities (1975-1979), 8:23212 (B;XE)
Imhausen, K.H., Optimization of combination of coal hydrogenation, Fischer-Tropsch synthesis and gasification for the production of

motor fuels, 8:22914 (R;DE;In German)
Inbody, M.A., *See* Dunn, P.F., 8:23767
Inganas, O., *See* Skotheim, T., 8:23286
Ingold, G., Measurement of neutron multiplicity distributions with scintillator tank, 8:24198 (RA;DE;In German)
See Bohlen, H.G., 8:24647
See Hilscher, D., 8:24684
Inoue, I., *See* Furuto, Y., 8:25020
Ioki, K., *See* Shimada, M., 8:24866
See Shinya, K., 8:25058
See Taylor, T., 8:24896
Ioriatti, E., *See* Sanger, P.A., 8:25049
Irving, P.M., Effect of NO_2 and SO_2 alone and in combination on the productivity of field-grown soybeans, 8:24406 (R;US)
Irwin, J.S., *See* Weber, A.H., 8:24253
Iseghem, P. van, Interaction of vitrified high level waste with clay environment, 8:23141 (RA;DE)
Isham, K.R., *See* Kenney, F.T., 8:24449
Ishibe, Y., *See* Noda, N., 8:24883
See Sakamoto, Y., 8:24880
Ishihara, H., *See* Gomay, Y., 8:25162
Ishii, M., Scaling criteria for LWR's under single-phase and two-phase natural circulation, 8:23603 (R;US)
Ishii, S., *See* Noda, N., 8:24883
See Sakamoto, Y., 8:24880
Isler, R.C., *See* Wooton, A.J., 8:24879
Isobe, S., *See* Nishimura, H., 8:25085
Isseroff, R., *See* Cain, W.S., 8:23830
See Leaderer, B.P., 8:23831
Itou, Y., *See* Obara, K., 8:25208
Itzhak, D., *See* Eliezer, D., 8:23912
Iwama, J., *See* Obara, K., 8:25208
Iwamoto, K., *See* Tsuchie, Y., 8:23455
Iwasa, Y., *See* Dawson, A.M., 8:23779
See Maeda, H., 8:25040
See Tsukamoto, O., 8:25016
Izumi, S., *See* Shimada, M., 8:24866
See Shinya, K., 8:25058
Izzo, R., Effects of toroidicity on resistive tearing modes, 8:24768 (R;US)

J

Jackson, J., Development and application of the NPPC commercial-energy-demand model, 8:23694 (R;US)
Jackson, P.L., *See* Christensen, D.H., 8:24492
Jackson, R.W., Nonlinear electrostatic waves: oblique propagation, 8:24800 (J;GB)
Jacmart, J.C., *See* Gamp, A., 8:24695
Jacobson, D., Analytical and experimental investigations of sodium heat pipes and thermal energy storage systems. Final report oct 80-sep 81, 8:24083 (R;US)
Jacobson, K.B., Enzyme and gene regulation in Drosophila, 8:24412 (RA;US)
Jacobson, V., *See* Elischer, V., 8:25104
Jacobson, V.L., *See* Cooper, W.S., 8:25084
Jacquet-Francillon, N., *See* Morlevat, J.P., 8:23132
Jadot, R., *See* Bougard, J., 8:23665
Jaeger, F., *See* Bell, C. R., 8:23312
Jaeger, H., *See* Reiter, R., 8:24232
Jahnke, U., Global increase of near- and below-barrier fusion for heavier systems, 8:24664 (RA;DE;In German, English)
See Birkelund, J.R., 8:24686
See Hilscher, D., 8:24684
See Ingold, G., 8:24198
Jakobsen, R.J., *See* Henry, W.M., 8:24051
Jakub, A., *See* Fleeter, R., 8:23046
Jalan, V., Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program, 8:23782 (R;US)
James, D.R., *See* Hunter, S.R., 8:24523
James, S.D., Effect of electrolyte water content on the anodic passivation of lithium in 1m lic104-propylene carbonate, 8:23669 (R;US)
Jang, T., Some factors influencing liver metallothionein levels in rats and mice, 8:24323 (J;US)
Janke, M., Construction of an apparatus for charge exchange, 8:24179 (RA;DE;In German)
See Nolte, G., 8:24538
Janle, H., Registration of shear waves, 8:24486 (R;DE;In German)
Jantzen, C.M., Ceramic nuclear waste forms, 8:23134 (RA;DE)
Leaching of polyphase nuclear waste ceramics: microstructural and phase characterization, 8:23181 (J;US)
Jarabak, A.J., *See* Singh, S.K., 8:25044
Jarlborg, T., Metamagnetism of palladium, 8:23894 (R;US)
See Knapp, G.S., 8:23945
Jarvinen, P.O., Advanced flywheel-storage system, 8:23662 (R;US)
Jarvis, J.B., Effect of trace metals and sulfite oxidation of adipic acid degradation in FGD systems. Final report Dec 81-May 82, 8:22957 (R;US)
Javidi, S., Conducted and radiated signatures of fluorescent lamp systems in C and I environments, 8:23823 (RA;US)
Jechart, I., *See* Banos, A. Jr., 8:24848
Jeffries, G.L., *See* Braid, T.H., 8:23587
Jellison, G.E. Jr., *See* Lowndes, D.H., 8:24038
See Young, R.T., 8:23288
Jendrzejczyk, J.A., Flow-induced vibration of a curved tube array subject to liquid cross flow, 8:23469 (R;US)
Jensen, A., *See* Ainscough, J.B., 8:23489
Jensen, G.A., *See* Tingey, G.L., 8:23170
Jensen, T., Radiative decay width of the rho⁻ meson, 8:24623 (J;US)
Jensen, T.H., Bumpy Z-pinch, 8:24917 (J;GB)
Feedback stabilization of tokamaks against slow axisymmetric MHD instabilities, 8:24914 (J;GB)
See McLain, F.W., 8:24913
Jernigan, M.C., *See* Ullrich, R.L., 8:24388
Jess, M., US-Canadian electricity trade, 8:23740 (R;US)
Joerss, K.E., *See* Schaerer, B., 8:24240
Johannes, A.H., *See* Altwicker, E.R., 8:24235
See Galloway, J.N., 8:24285
Johanson, W.R., Fermi-surface properties of $CeSn_3$ and related compounds, 8:23947 (R;US)
Johnson, A.C., *See* Kenney, F.T., 8:24449
Johnson, B.C., *See* Summers, M.A., 8:25148
Johnson, B.M., *See* Kreid, D.K., 8:24110
Johnson, D.R., *See* Newton, R.A., 8:23561
Johnson, E.R., *See* McKelvey, T.E., 8:24968
Johnson, H.G., Electrical insulation qualification tests for TFTR TF and PF coils, 8:25007 (J;US)
Johnson, I., Exploratory and basic fluidized-bed combustion studies. Annual report, October 1980-September 1981, 8:24148 (R;US)
Johnson, J.A., Ultrasonic-image reconstruction with surface mapping and synthetic-aperture techniques, 8:24141 (R;US)
Johnson, J.D., CRAC calculations for accident sections of environmental statements, 8:23633 (R;US)
Johnson, K.H., SCF-X alpha-SW cluster molecular-orbital models of catalysts, alloys, magnetic materials, and superconductors. Interim report, 8:23891 (R;US)
Johnson, M.E., *See* Crowe, B.M., 8:23189
Johnson, R.G., *See* Bowman, C.D., 8:24728
Johnson, R.P., Stochastic stacking without filters, 8:24194 (R;US)
Johnson, T., *See* Berry, G., 8:23772
Johnson, T.R., *See* Dunn, P.F., 8:23767
Johnston, T.W., *See* Boucher, C., 8:24862
Joiner, E., *See* Celoni, C., 8:25254
Jokela, T.A., *See* Noshkin, V.E., 8:24295
Jolly, E.L., *See* Carlson, R.L., 8:24915
Jones, A.K., *See* Swenson, D.V., 8:23028
Jones, E.D., *See* Brannon, P.J., 8:24007
Jones, J.L., *See* Merrill, B.J., 8:24891
Jones, M.H., *See* Volkin, E., 8:24315
Jones, R., *See* Childs, W., 8:23465
Jones, R.E., XERROR; Fortran library error-handling package, 8:25263 (R;US)
Jones, R.H., *See* Bruemmer, S.M., 8:23898
Jones, R.J., Selected measurement methods for plutonium and uranium in the nuclear fuel cycle, 8:23197 (R;US)
Jones, S.C., *See* Orren, L.H., 8:23376
Jones, T.L., Field and laboratory evaluation of the mobility of cobalt-60/EDTA in an arid environment, 8:23167 (R;US)
Jorgensen, J., *See* Furimsky, E., 8:22906
Jorgensen, J.D., Lead deficiency and hydrogen content in battery electrode beta-PbO_2, 8:23684 (J;US)
Jory, H., *See* Loring, C.M., 8:25121
Joseph, J., *See* Atabek, R., 8:23484
Joshi, C.B., Sample survey of traditional water wheels and small water turbines in nepal: a preliminary report, 8:23242 (R;US)
Joshi, H.M., *See* Webb, R.L., 8:24104, 8:24105
Jostes, R., Kinetics of mutation and sister-chromatid exchange induction by ethyl methanesulfonate in Chinese hamster ovary cells, 8:24476 (J;NL)
Joubert, J.I., *See* Demski, R.J., 8:22945, 8:22953
See Pan, Y.S., 8:22998
See Yeh, J.T., 8:23428
Jung, J., Neutronic analysis of graphite-moderated solid breeder design for INTOR, 8:24824 (R;US)
Neutronics analysis of graphite-moderated solid breeder blanket designs for INTOR, 8:24957 (J;US)

Nuclear analysis of a d-d tokamak reactor design, wildcat, 8:24912 (J;US)
See Evans, K. Jr., 8:24817
See Morgan, G.D., 8:24956
See Smith, D.L., 8:24823, 8:25173
Jungclas, H., *See* Ingold, G., 8:24198
Junkrans, S., ASEA-ATOM BWR fuel rod experience at high burnup, 8:23452 (RA;US)
Juntgen, H., *See* Wanzl, K., 8:22904
Jury, S.H., *See* Fine, H.A., 8:23834

K

Kaczmarczyk, J., *See* Dobrzelecki, R., 8:22988
Kagey, B.T., Mortality as influenced by alteration of Pennsylvanian shale by strip mining of coal, 8:24458 (J;US)
Kahl, L., *See* Saidl, J., 8:23130
Kahler, J.P., *See* Weber, A.H., 8:24253
Kaiser, R.S., *See* Wilson, H.W., 8:23475
Kaji, H., *See* Saito, K., 8:24460
Kajiura, S., Full-scale model of cooling and heating system for JT-60 vacuum vessel, 8:25212 (J;US)
See Shimizu, M., 8:24927
Kalfon, C., *See* Sire, G., 8:24925
Kalia, R.K., Molecular-dynamics study of 2-D melting: long-range potentials, 8:24520 (R;US)
Kalimullah, *See* Persiani, P.J., 8:23190
Kalnavarns, J., Generation of multipole nulls in a tokamak geometry, 8:24995 (J;US)
Kalogeropoulos, T.E., Antinucleon time separated beams (TSB), 8:24182 (RA;US)
Kalos, M.H., *See* Moskowitz, J.W., 8:24564
Kalsi, S.S., Calculation of transient current response of a set of coupled circuits using an eigenvalue technique, 8:24992 (J;US)
Kambe, T., *See* Ogata, A., 8:25198
Kameari, A., *See* Kasai, M., 8:24935
Kaminsky, E.L., Design of the precast, post-tensioned concrete shielding structure for the TFTR neutral beam test cell, 8:25116 (J;US)
Kanamori, T., *See* Abe, M., 8:25181
Kanda, K., *See* Shibata, T., 8:23604
Kandarpa, V., Useful technique to study particle invasion in porous media by backscattered electron imaging, 8:23015 (J;US)
Kane, J.F., *See* Rienecker, F. Jr., 8:25149
Kane, V.E., PCTEST; principal component test for outliers, 8:25237 (R;US)
Kang, W.M., *See* Tobin, J.G., 8:23981
Kanter, E., *See* Vager, Z., 8:24542
Kanter, E.P., *See* Cue, N., 8:24515
See Schneider, D., 8:24557
Kanter, H.J., *See* Reiter, R., 8:24232
Kantus, R., Atomic masses of rare-earth isotopes, 8:24679 (RA;DE;In German)
Kao, J.Y., *See* Holland, J.M., 8:24446
Kaper, H.G., Linear transport theory and an indefinite Sturm-Liouville problem, 8:24722 (R;US)
Kapil, S.K., *See* Smith, M.L., 8:23491
Kaplan, M.P., Forecasts of intercity passenger demand and energy use through 2000, 8:23843 (R;US)
Kaplan, S.I., Experience with a grid-interactive solar photovoltaic electric system, 8:23296 (J;US)
Kapsch, D.M., Isotachophoresis, 8:24050 (R;US)
Karbowski, J.S., *See* Chi, J.W.H., 8:24976
Karin, N.J., *See* Cook, J.S., 8:24352
Karin, S., *See* Shephard, G.W., 8:25168
Kark, J.B., *See* Revis, N., 8:24447
Karkheck, J., Comment on: On the Chapman—Enskog solution method for mixtures [B. C. Eu, J. Chem. Phys. 74, 6373 (1981)], 8:24752 (J;US)
Karlau, J., *See* Ehrich, H., 8:24888
Karlsson, B., Optical properties of solids for solar energy conversion, 8:24006 (R;US)
Karsanova, S.K., *See* Vorobyev, Y.I., 8:24343
Kasahara, T., *See* Naito, T., 8:23199
Kasai, M., Sensitivity study code for tokamak devices, 8:24935 (J;US)
Kasler, J.S., *See* Lubin, A.H., 8:24459, 8:24468
Kataoka, I., *See* Ishii, M., 8:23603
Kaths, D.S., In vivo cytogenetic effect of some salts of the heavy metals cadmium, chromium, mercury, and platinum in assays of micronuclei and sister chromatid exchange, 8:24411 (R;DE;In German)
Kato, T., Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (III), 8:24020 (TJ;US)
Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (II), 8:24021 (TJ;US)
Katz, J.J., Organisms and compounds of unnatural isotopic composition in NMR, 8:24348 (R;US)
Katz, M., Arc notching on PDX neutral beams, 8:24809 (J;US)
Katz, M.H., Computer control of electrochemical experiments with application to zinc/nickel oxide cells, 8:23679 (R;US)
Kauffmann, Y., Fission gas release at high burnup, 8:23482 (RA;US)
Kaufman, A., Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978, 8:23790 (R;US)
Kaufman, S., *See* Lewis, D., 8:24174
Kaufmann, P., *See* Froebrich, P., 8:24709
Kaufmann, R.F., Radioactivity in groundwater associated with uranium and phosphate mining and processing, 8:24298 (J;US)
Kaul, D., *See* Goetz, J., 8:24359
Kaupang, B.M., Assessment of distributed wind-power systems. Final report, 8:23391 (R;US)
Assessment of distributed wind-power systems, 8:23392 (R;US)
Kawahata, K., *See* Gomay, Y., 8:24860
See Noda, N., 8:24883
See Sakamoto, Y., 8:24880
Kawamoto, N., *See* Ohkubo, M., 8:25001
Kawamura, S., *See* Ninomiya, M., 8:23133
Kawamura, T., Formation of magnetic islands and ergodic magnetic layers in wall-lapping plasma as a non-divertor concept for a reactor-relevant tokamak, 8:24851 (J;NL)
Wall material characteristics in reacting plasma modelling, 8:24876 (J;NL)
Kawasumi, Y., *See* Noda, N., 8:24883
See Sakamoto, Y., 8:24880
Kearney, W.M., Environmental pollution control at the AMAX-Homestake lead smelter, 8:24245 (J;US)
Keck, C.E., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Kee, B.F., *See* Wang, J.C.F., 8:24242
Kee, R.J., Fortran computer-code package for the evaluation of gas-phase viscosities, conductivities, and diffusion coefficients, 8:24137 (R;US)
Keilhacker, M., Divertors and impurity control: where we stand, where we have to go, 8:24867 (J;NL)
Keinert, J., Re-evaluation of the neutron scattering dynamics in heavy water, generation of multigroup cross sections for THERM-126, 8:24724 (R;DE)
Keiser, J., In-situ studies of reduction reactions of weathering steel surface films by Raman spectroscopy, 8:23900 (RA;US)
Kelbch, S., *See* Gruber, G., 8:24543
Kelland, D.R., Magnetite recovery in coal washing by high-gradient magnetic separation. Quarterly project status report, 13th quarter, 8:22985 (R;US)
Keller, C.E., Proceedings of a workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of Outer Continental Shelf development, 8:23040 (R;US)
Keller, L., Structure of metallic coatings for impurity control in MACROTOR, 8:24882 (J;NL)
See Schwirzke, F., 8:24905
Kelley, M.D., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Kellogg, J.C., *See* Nelin, K., 8:25026
Kelly, E.M., *See* Russell, W.L., 8:24382
Kelly, R.L., πN, anti KN, and KN phenomenology, 8:24588 (RA;US)
Kelman, B.J., Effects of monomeric ^{239}Pu on the fetal rabbit, 8:24394 (J;GB)
Kelsey, P.V. Jr., Development of an improved-contact liquid-level probe for pressurized reactor vessels, 8:23495 (R;US)
Kempka, S.N., *See* Eakes, R.G., 8:24113
Kendall, P.W., *See* Holte, H.O., 8:23349
Kennedy, M.F., PWR systems transient analysis: a reactor-safety perspective, 8:23600 (R;US)
See Chung, K.S., 8:23601
Kennel, S.J., Tumor cell surface proteins, 8:24321 (RA;US)
Kenney, F.T., Regulation of gene expression, 8:24449 (RA;US)
Kenney, W.J., *See* Ballou, J.K., 8:24125
See Miller, J.R., 8:24126
Kerman, A.K., Quark bags, 8:24613 (RA;US)

Kessel, C., *See* Wong, C.P.C., 8:24978
Kessler, J.H., *See* Moore, J.G., 8:23131
Kester, J.J., Surface enhanced Raman scattering in corrosion science: benzotriazole on copper, 8:23987 (J;US)
Ketoff, A., *See* Chern, W.S., 8:23818
Khalil, A., *See* Eyssa, Y.M., 8:25030
See Van Sciver, S.W., 8:24129
Khan, T.R., *See* Meranger, J.C., 8:24246
Khattar, M.K., *See* Chandra, S., 8:23319
Khinkis, M.J., *See* Abbasi, H.A., 8:24152
Khoo, T.L., Shell structure at high spin and the influence on nuclear shapes, 8:24681 (R;US)
Kidybinski, A., Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls, 8:22978 (R;US)
Kiehne, T., *See* Arndt, P., 8:24161
Kienle, P., *See* Bohn, H., 8:24202
Kienzler, B., *See* Smailos, E., 8:24108
Kiessling, R., Bipolar lead accumulator cell with high energy density, 8:23671 (R;DE;In German)
Kihara, R., *See* Kulke, B., 8:24189
Kilian, D.C., Sphere-pac fuel development program. Semi-annual progress report, April 1982-September 1982, 8:23106 (R;US)
Killmeyer, R.P., Coal preparation for synfuels: where do we stand, 8:22983 (R;US)
Dense-medium cycloning of fine coal at low specific gravities, 8:22987 (R;US)
Killpack, T., SLUMB.REV0; one-dimensional Schlumberger inversion program, 8:23364 (R;US)
Killpack, T.J., IP2D.REV1; resistivity & induced-polarization, 8:23367 (R;US)
See Sill, W.R., 8:23366
Kilpatrick, N.J., *See* Truhlar, D.G., 8:24063
Kilsdonk, D., *See* Miller, W.E., 8:23672
Kim, H.J., Development of ferritic weldments for grain-refined ferritic steels for 4.2K service, 8:23971 (R;US)
Kim, J., *See* Fasolo, J.A., 8:25091
Kim, J.S., *See* Chung, K.S., 8:23601
Kim, N.S., Magnet system for a thermal barrier Tandem Mirror Reactor, 8:24989 (J;US)
Kim, S.H., Argonne pulsed cable test facility for the development of superconducting ohmic heating coils, 8:25052 (J;US)
Development of superconducting poloidal field coils for tokamak reactors, 8:25043 (J;US)
See Turner, L.R., 8:25046
Kimishima, T., Fatigue data of molybdenum, 8:25164 (J;US)
Kimoto, H., *See* Miyata, H., 8:24999, 8:25000
Kimrey, H.D., *See* Loring, C.M., 8:25121
Kimura, T., Optimization of sequential control in operation of fusion device, 8:25180 (J;US)
See Hosogane, N., 8:25179
See Suzuki, Y., 8:25177
Kincaid, J.M., *See* Karkheck, J., 8:24752
See Lopez de Haro, M., 8:24751
Kindermann, *See* Hartung, 8:23304
King, R.E., *See* McCracken, G.M., 8:24887
King, S.P., *See* Koehler, W.C., 8:24732
King, W.E., Molecular-dynamics simulation of displacement cascades in Cu: analysis of replacement sequences, 8:23934 (R;US)
Re-examination of the threshold energy surface in copper, 8:23935 (R;US)
Threshold energy surface and Frenkel-pair resistivity for Cu, 8:23948 (R;US)
Kinnie, I.G., Solar-energy-system performance evaluation: Living Systems single-family residence, Davis, California, October 1978-March 1979, 8:23336 (R;US)
Kinnison, W.W., Normal muon decay and the Los Alamos TPC project, 8:24598 (RA;US)
Kinsman, J.D., Inventory of acid-deposition research projects funded by the private sector. Final report, 8:24237 (R;US)
Kintner, E.E., Beginning steps toward fusion technology development, 8:24983 (J;US)
Kirchhof, D., *See* Imhausen, K.H., 8:22914
Kirchner, J., Torus design for the fusion engineering device (FED), 8:25050 (J;US)
Kirchner, W.L., REFLUX; LWR reflood heat transfer prediction, 8:23445 (R;US)
Kirkham, R.R., *See* Jones, T.L., 8:23167
Kirschke, P., *See* Scheer, J., 8:24048
Kispert, L.D., *See* Samskog, P., 8:24077
Kisslinger, L.S., *See* Bowman, J.D., 8:24578
Kitagawa, S., *See* Hamada, Y., 8:24994
Kitsunezaki, A., *See* Shinya, K., 8:25058
Kitzmann, I., *See* Doenitz, W., 8:23203
Kiyama, H., Ceramic torodail vacuum chamber and wall conditioning for the ETL-TPE-2 experiment, 8:25205 (J;US)
Kiyama, S., *See* Ikeda, N., 8:24946
See Kiyama, H., 8:25205
Klabunde, C.E., *See* Poker, D.B., 8:23978
Klainer, S.M., Unique developments in laser-induced fluorescence fluorimetry (LIFF), 8:24294 (RA;US)
Klann, R., *See* Marchok, A.C., 8:24443
Klaumuenzer, S., *See* Metzner, H., 8:23964
See Rentzsch, S., 8:23965
Klebanoff, L.E., *See* Tobin, J.G., 8:23981
Kleeman, P.T., BECOM-BNL; buildings energy optimization model, 8:23795 (R;US)
Klein, A.W., *See* Schaerer, B., 8:24240
Klein, M.P., *See* Bogomolni, R.A., 8:24074
Klein, M.V., *See* Wada, N., 8:24032
Klein, T.M., *See* Chang, F.H., 8:24256
Klein-Szanto, A.J.P., *See* Marchok, A.C., 8:24443
See Terzaghi, M., 8:24444
Kleinhans, U., *See* Scharmer, K., 8:23259
Kleinman, L., *See* Shannon, J.D., 8:24231
Kleinonen, J., *See* Graef, H., 8:24688
Klemm, J., *See* Frank, G., 8:24360
See Goetz, J., 8:24359
Klepper, M., Innovative financing for energy-efficiency improvements. Phase II report: model documents and financial projections, 8:23705 (R;US)
Klett, D.E., Renewable energy system feasibility study. Final report 2 Sep 80-30 Apr 82, 8:23252 (R;US)
Klickman, A.E., *See* Cowking, C.B., 8:23590
Klimczak, G.W., Development of copper electroplating for large accelerating structures for heavy ion fusion, 8:24164 (J;US)
Klippert, T.E., *See* Radousky, H.B., 8:24015
Kloet, W.M., I=1 dibaryons - theoretical, 8:24610 (RA;US)
Klotz, D., Radionuclide migration of the elements I, Sr, Cs and Ce in subsurface loose rocks, 8:24263 (R;DE;In German)
Kluge, D., *See* Lehmann, H.J., 8:23049
Kluge, G., *See* Palecki, E., 8:22970
Kluge, H., *See* Agarwal, Y.K., 8:24689
See Decman, D.J., 8:24698, 8:24699
See Egelhaaf, C., 8:24653
See Froebrich, P., 8:24667
Klusek, T.C., *See* Heit, M., 8:24288
Kmetyk, L.N., RELAP5 assessment: FLECHT SEASET steam-generator test 23402, 8:23632 (R;US)
Knaab, H., *See* Stehle, H., 8:23450
Knapp, G.S., Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R;US)
See Radousky, H.B., 8:24015
Knauf, E., *See* Vielstich, W., 8:23784
Knize, R.J., *See* Cecchi, J.L., 8:24857
Knorovski, G.A., Fracture toughness of PWR-components supports, 8:23505 (R;US)
Knott, M., *See* Praeg, W.F., 8:24970
Knowles, T.R., Chemisorptive discharge of hydrogen ions: An elementary step in hydrogen corrosion, 8:23954 (R;DE)
Knudsen, P., Risoe Fission Gas Project: an overview, 8:23462 (RA;US)
See Hollowell, T.E., 8:23483
Knuth, D., *See* Beck, H.P., 8:23431
Kobayashi, S., Development of large-scale thyristor dc circuit breaker, 8:25059 (J;US)
Kobayashi, T., *See* Abe, M., 8:25181
Koch, A., *See* Doenitz, W., 8:23203
Koch, M., *See* Hall, J.C., 8:23668
Kocks, U.F., Initiation and development of deformation heterogeneities in superplastic materials, 8:24739 (R;US)
Koegler, S.S., *See* Kilian, D.C., 8:23106
Koehler, T., *See* Leibbrand, W., 8:23430
Koehler, W.C., National Center for Small-Angle Scattering Research, 8:24732 (BA;US)
Koelling, D.D., Band model for d- and f-metals, 8:23946 (R;US)
Koenig, J., *See* Bohn, H., 8:24202
Koenig, N., Heat energy consumption and intermittent heating, 8:23800 (R;DE;In German)
Koenig, R.A., *See* Neuls, A.S., 8:23147
Koerner, H.J., *See* Bohn, H., 8:24202
Koester, R., *See* Smailos, E., 8:24108
Kohler, G.O., *See* Edwards, R.H., 8:23869
Kohlmeyer, B., *See* Lehr, H., 8:24668
Kohn, A., *See* Sturtz, G., 8:24070
Kohout, J.B., *See* Peterson, R.E., 8:23059
Koizumi, H., *See* Gomay, Y., 8:25162
Koizumi, M., *See* Shimizu, M., 8:24927
Kojima, H., *See* Miyata, H., 8:24999, 8:25000
Kolaczkowski, A.M., *See* Carlson, D.D., 8:23629
Kolb, G.J., *See* Carlson, D.D., 8:23629
Kollatz, M., *See* Bohne, W., 8:24687
Kollerbaur, J., Secondary electron spectra in the trace of fast ions travelling

through water vapor, 8:24738 (R;DE;In German)
Kollotzek, H., *See* Buechl, K., 8:25119
Kolstad, C.D., Modeling international steam-coal trade, 8:23007 (R;US)
Komar, C.A., Unconventional gas resources, 8:23075 (R;US)
Komarek, P., International Conference on Magnet Technology, 7th, MT-7, 1981, 8:24116 (J;US)
Kondo, I., *See* Hosogane, N., 8:25179
See Suzuki, Y., 8:25177
Konrad, C.H., *See* Brannon, P.J., 8:24007
Koop, E., *See* Ingold, G., 8:24198
Koopman, R.P., Large-scale hazardous gas release experiments, 8:23069 (R;US)
Koponen, B.L., Nuclear criticality safety experiments, calculations, and analyses: 1958 to 1982. Volume 1. Lookup tables, 8:23544 (R;US)
Nuclear criticality safety experiments, calculations, and analyses - 1958 to 1982. Volume 2. Summaries. Complilation of papers from the Transactions of the American Nuclear Society, 8:23545 (R;US)
Kopp, M.K., New gas mixture improves performance of ^{3}He neutron counters, 8:24207 (J;NL)
Koppel, J.U., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Korolev, V.G., *See* Gracheva, L.M., 8:24396
Korte, F., *See* Haag, M., 8:24262
Kortheuer, J.D., *See* Coleman, T.A., 8:23476
Kortheurer, J.D., *See* Newman, L.W., 8:23492
Korzen, W., *See* Bell, C. R., 8:23312
Kosky, J.P., *See* Wilcke, W.W., 8:24685
Kosobud, R.F., Role of the breeder in long-term energy economics, 8:23701 (R;US)
Koszykowski, M.L., *See* Noid, D.W., 8:24561
Kot, C.A., *See* Youngdahl, C.K., 8:23510
Kottenstette, R.J., Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R;US)
Kotzlowski, H.E., Modular first wall concept for steady state operation, 8:24965 (J;US)
Koucky, R.W., *See* Darling, S.L., 8:22931
Kouri, D.J., *See* Evans, J.W., 8:24065, 8:24638
Kouvel, J.S., *See* Radousky, H.B., 8:24015
Kovar, D., *See* Buergel, M., 8:24693
See Morgenstern, H., 8:24662
See Rauch, W., 8:24660
Kovar, D.G., Study of inelastic and single-neutron transfer reactions induced by 14.5 MeV/A ^{20}Ne ions on ^{40}Ca, 8:24659 (RA;DE;In German, English)
Study of ^{20}Ne + ^{40}Ca at Esub(lab)/A = 14.5 MeV, 8:24661 (RA;DE;In German, English)
Kozinsky, E.J., *See* Topmiller, D.A., 8:23630
Kozlowski, T., Los Alamos Meson Physics Facility high-resolution-spectrometer dipole magnets: a summary report, 8:24184 (R;US)
Kozub, T., Development and operation of PDX neutral beam computer system, 8:25102 (J;US)
See Williams, M.D., 8:25081
Krafft, G., *See* Green, M.A., 8:24121
Kraft, T.E., *See* Kramer, J.M., 8:23589
Krakowski, R.A., *See* Driemeyer, D.E., 8:25171
See Miller, R.L., 8:24932
Kramer, J.J., *See* Hall, I.W., 8:23984
Kramer, J.M., Analysis of recent fuel-disruption experiments, 8:23589 (R;US)
Kramer, L., *See* Spencer, H., 8:24461
Kramer, S.D., *See* Payne, M.G., 8:24559
Krammen, J.E., *See* Suski, G.J., 8:25151
Krappe, H.J., Error propagation in fitting optical potentials to elastic heavy-ion scattering, 8:24655 (RA;DE;In German)
Error propagation in the phase analysis of elastic scattering data, 8:24656 (RA;DE;In German)
Folding methods in heavy-ion physics, 8:24711 (RA;DE;In German)
Kraus, S., *See* Crouch, F.W., 8:24047
Krause, K.H., *See* Yugo, J.J., 8:24776
Krauss, A.R., Self-sustaining erosion-resistant low z coatings for first wall and limiter applications I: theory, 8:24967 (J;US)
Sputter-induced erosion of alkali metal surfaces - AES, XPS and SIMS studies, 8:24759 (R;US)
See DeWald, A.B., 8:24877
See Gruen, D.M., 8:24904
Krauth, H., Progress renort on the tandem contribution to the IEA Large Coil Task, 8:25055 (J;US)
See Zehlein, H., 8:25013
Krazinski, J.L., Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R;US)
Kreid, D.K., Investigation of combined heat and mass transfer from a wet heat exchanger. Part 1. Formulation of an approximate heat/mass transfer model for calculating the performance of heat exchangers in dry/wet operation, 8:24110 (R;US)
Kreutzer, K., *See* Dauber, E., 8:23849
Krieb, K.H., Further development on a 170 MW prototype plant with pressurized coal gasification and gas-/steam turbine power plant at Luenen, 8:22912 (R;DE;In German)
Krieg, R.D., *See* Knorovski, G.A., 8:23505
Krieger, C.I., *See* Kim, S.H., 8:25052
Kritz, A.H., Ray-tracing study of electron-cyclotron heating in toroidal geometry, 8:24767 (R;US)
Kroeger, F.A., *See* El-Aiat, M.M., 8:24013
Kroepfl, D.J., *See* Severyn, J.R., 8:25152
Kron, N.F. Jr., Content of local-energy-management programs, 8:23703 (R;US)
Kropp, W.R., *See* Pasierb, E.L., 8:24586
Krueger, U., Possibilities of welding as a joining process in airframe construction, 8:24130 (TJ;US)
Krupa, J.C., Optical spectroscopy and electron paramagnetic resonance of Pa^{4+} in $ThBr_4$ and $ThCl_4$ crystals, 8:23889 (J;US)
Krupa, J.F., Mechanical-reliability evaluation of a proposed emergency-response radioiodine air sampler, 8:24249 (R;US)
Krupke, W.F., *See* Emmett, J.L., 8:24844
Kruse, G.S., *See* Hackley, D.S., 8:25045
See Luton, J.N. Jr., 8:25036
Kubasco, A.J., *See* Ward, M.E., 8:23418
Kubicki, J., Evaluation of the effect of anions on the corrosion of aluminum in water, 8:23989 (TJ;US)
Kubota, Y., *See* Ogasawara, T., 8:25041
Kucuk, F., Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R;US)
Kudo, H., *See* Yamaguchi, K., 8:25124
Kuehn, G., *See* Hentschel, J., 8:23045
Kuehn, L., Investigation of the use of coal-waste as raw-material for the production of aluminium, 8:22944 (R;DE;In German)
Kuemmerle, N.B., *See* Masker, W.E., 8:24311
Kuenzel, H., Insulation of exterior walls, placement of radiators and room climate, 8:23798 (R;DE;In German)
Window and its heat balance considering solar radiation and additional insulation measures, 8:23799 (R;DE;In German)
Kugel, H.W., *See* Kozub, T., 8:25102
See Williams, M.D., 8:25081
Kuhn, W.L., Using process instrumentation to obviate destructive examination of canisters of HLW glass, 8:23169 (R;US)
See Westsik, J.H. Jr., 8:23159
Kuhnes, U., *See* Hassan, A.M., 8:24049
Kuizenga, D.J., *See* Murray, J.E., 8:25145
Kulcinski, G.L., *See* Hassanein, A.M., 8:24893
See Sawan, M.E., 8:25220
See Sviatoslasky, I.N., 8:24939
Kuliasha, M.A., STOPS; power system short-term optimization, 8:23402 (R;US)
Kulish, V.V., *See* Zhurakhovskii, V.A., 8:24750
Kulkarni, A.K., *See* Webb, R.L., 8:23861
Kulke, B., Recent performance improvements on FXR, 8:24189 (R;US)
Kulsrud, R.M., *See* Freund, H.P., 8:24807
Kumagai, K., ^{11}B study of spin dynamics in Y/sub 1-x/RE/sub x/Rh_4B_4, 8:23999 (R;US)
Kumahara, T., *See* Ogata, A., 8:25198
Kumar, K.H., Most general density-cubic equation of state: application to pure nonpolar fluids, 8:24072 (J;US)
Kunishi, H., *See* Wilson, H.W., 8:23475
Kunstreich, S., *See* Girard, B., 8:23205
Kunz, C.L., *See* Brown, P.D., 8:23534
Kunze, R.C., Damping elements in the high-voltage circuits of the ASDEX neutral injectors, 8:25089 (J;US)
Kupka, K.H., Investigation of water chemical effects resulting from the application of additivs in MSF-plants, 8:23847 (R;DE;In German)
Kupke, C., *See* Koenig, N., 8:23800
Kurasaki, M., *See* Saito, K., 8:24460
Kurasawa, T., *See* Finn, P.A., 8:24959
Kurihara, K., *See* Hosogane, N., 8:25179
Kuriyama, M., Construction of prototype injector unit for JT-60, 8:25110 (J;US)
Kusano, I., *See* Regan, J.D., 8:24417
Kustom, R.L., Control of energy transfer with an inductor-convertor bridge, 8:24102 (R;US)

See Ehsani, M., 8:24821, 8:25070
Kutina, R., *See* Cue, N., 8:24515
Kuzmichev, V.E., Particle-two particle interaction in configuration space, 8:24748 (R;DE)
Kvick, A., *See* Liminga, R., 8:24040
Kwan, T.J.T., Efficiency of free-electron lasers with a scattered electron beam, 8:24134 (J;US)
Kwok, H.S., Photodissociation of nitromethane at 266 nm, 8:24562 (J;US)
Kyanowski, A., *See* Morgenstern, H., 8:24662

L

Laats, E.T., FUELS DATA; model verification fuel rod data, 8:23446 (R;US)
See Scofield, N.R., 8:23628
Labiak, W.G., *See* Minor, E.G., 8:24953
Lacey, J.J., Overview of coal liquefaction in the US Department of Energy, 8:22917 (R;US)
Lackey, W.J., *See* Stinton, D.P., 8:23108
Lackner, K., *See* Keilhacker, M., 8:24867
Lagasse, L.G., Radiation therapy: model standards for determination of need, 8:24341 (R;US)
Laikin, E., *See* Murphy, D.P., 8:25153
Lake, S., *See* Pinkel, D., 8:24327
Lakey, L.T., International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R;US)
Lakins, A.B., *See* Lambright, W.H., 8:24304, 8:24305
Lalley, P.A., Genetic basis of mutagenesis and carcinogenesis, 8:24418 (RA;US)
Genetic dissection of DNA repair in xeroderma pigmentosum cells, 8:24378 (RA;US)
See Regan, J.D., 8:24377
Lam, D.J., *See* Veal, B.W., 8:24030
Lam, N.Q., Ion-bombardment-induced subsurface composition modifications in alloys at elevated temperatures, 8:23932 (R;US)
Lamb, G.D., *See* Tree, D.R., 8:23839
Lambert, D.G., Relationship of body and surface wave magnitudes for small earthquakes and explosions. Scientific report, 8:24223 (R;US)
Lambert, H.W., IMPORTANCE; FTA basic event & cut set ranking, 8:25240 (R;US)
Lambert, J.E., History of remote handling at LAMPF, 8:24192 (J;US)
Lambright, W.H., State-local relations and urban technology: a study in intergovernmental decision making - executive summary, 8:24304 (R;US)
State-local relations and urban technology: a study in intergovernmental decision making, 8:24305 (R;US)
Lami, A., Predissociation in an intense electromagnetic field, 8:24754 (J;US)
Lamoreaux, G.H., *See* Eakes, R.G., 8:24113
Land, C.E., *See* McGregor, D.H., 8:24357
Lane, N.F., *See* West, B.W., 8:24553
Lang, H., *See* Klotz, D., 8:24263
Lang, P.M., *See* Murphie, W.E., 8:23533
Lang, R., *See* Buechl, K., 8:25119
Lange, M., *See* Schaerer, B., 8:24240
Langfeldt, S.L., *See* Hardy, L.C., 8:23099, 8:23100
See Shettel, D.L. Jr., 8:23098
Langmuir, M.E., Electrochemical photovoltaic cells based on n-GaAs and the triiodide/iodide redox couple in acetonitrile, 8:23285 (J;US)
Langton, W.G., *See* Thome, R.J., 8:24990, 8:24993
Lankford, P.K., *See* Kennel, S.J., 8:24321
Lann, R., *See* Jackson, J., 8:23694
Lanza, F., Critical review of radiation effects on borosilicate glasses, 8:24004 (RA;DE)
Lapides, M.E., *See* Dau, G.J., 8:23464
Lappa, D.A., *See* Alesso, H.P., 8:23638
Lappenbusch, W.L., *See* Cothern, C.R., 8:24353
Larbalestier, D.L., *See* Braginski, A.I., 8:24128
Laret, J., *See* Heikhaus, H.H., 8:23322
Lari, R.J., *See* Praeg, W.F., 8:24970
See Turner, L.R., 8:24971
Larimer, F.W., *See* Epler, J.L., 8:24415
Larsen, J.T., *See* Mayer, F.J., 8:24849
Larsen, M.M., *See* Russell, L.B., 8:24336
Larson, N.M., DENDRO; hierarchical cluster analysis of data, 8:25255 (R;US)
ODMOD; soil-water trace-containment transport, 8:24274 (R;US)
SPEKEN; Pearson, Spearman & Kendall correlation, 8:25241 (R;US)
Larson, R., Large source test stand for H/ sup -/(D/sup -/) ion source, 8:24928 (J;US)
Larson, T.K., Application of a honeycomb insulator design in a variable high-temperature, high-pressure environment, 8:23658 (J;US)
Last, J.R., *See* Salpietro, E., 8:25032
Lau, Y.Y., Reply to the Comments of B. K. Shivamoggi, 8:24791 (J;US)
Laughlin, R.B., Universal behavior in the electrical conductivity of strong-scattering expanded fluid metals, 8:24572 (J;US)
Lavender, K.E., *See* McCracken, G.M., 8:24887
Lawler, B.E., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Lawson, J.E., CAMAC timing and sequencing module, 8:25196 (J;US)
Layer, G.T., *See* Ebersbach, K.F., 8:23848
Layton, R.P., Computer-assisted system for determination of O_2 consumption and CO_2 production in man. Final report, 8:24399 (R;US)
Lazarus, R.B., Self-similar solutions for converging shocks and collapsing cavities, 8:24573 (J;US)
Leaderer, B.P., Tobacco smoke in occupied spaces: ventilation requirements. Paper 81.22.4, 8:23831 (J;US)
See Cain, W.S., 8:23830
Leaf, G.K., DISPL1; 1- and 2-dimensional kinetics-diffusion partial differential equations solution, 8:24569 (R;US)
Leander, G.A., High spins in gamma-soft nuclei, 8:24704 (R;US)
See Chen, Y.S., 8:24672
Lear, J.M., *See* Davies, B.E., 8:24260
Lebrun, J., *See* Heikhaus, H.H., 8:23322
Lee, A.Y., Thermal and structural analysis of solid divertor targets for e-beam testing, 8:25209 (J;US)
See Hopkins, G.W., 8:23501, 8:23502, 8:23503
Lee, D.K., *See* Uckan, N.A., 8:25031
Lee, E., *See* Hartman, F.C., 8:24320
Lee, E.H., *See* Jacobson, K.B., 8:24412
Lee, E.L., High-energy propellant studies: introduction and overview, 8:24215 (R;US)
Lee, J., Three-dimensional thermal modeling of eV batteries, 8:23884 (R;US)
Lee, J.D., *See* Moir, R.W., 8:24838
Lee, J.K., Tearing modes in a general cross-section force-free cylindrical tokamak, 8:24786 (J;US)
Lee, J.R., *See* Sanford, T.W.L., 8:24729
Lee, K., *See* Guldmann, J.M., 8:23065
Lee, K.J., *See* Peterson, R.R., 8:24920
Lee, K.L., *See* Kenney, F.T., 8:24449
Lee, M., *See* Jang, T., 8:24323
Lee, S., Comparison of COMETHE-IIIJ and FCODE-BETA fission gas-release predictions with measurements. Final report, 8:23466 (R;US)
Lee, S.K., *See* Selby, P.B., 8:24383
Lee, S.S., *See* Selby, P.B., 8:24428
Lee, T.K., *See* Orren, L.H., 8:23376
Lee, W.H., *See* Regan, J.D., 8:24417
Lee, X.S., *See* Tsang, K.T., 8:24774
Lee, Y.T., *See* Kwok, H.S., 8:24562
Leech, M.C., Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R;US)
Duty-cycle investigations of continuous miners. Volume II. Instrument manual, 8:22975 (R;US)
Legnini, D.G., *See* Smedskjaer, L.C., 8:23933, 8:23941
Legotte, P.A., *See* Sutton, D.C., 8:24473
Lehmann, H.J., Three-dimensional migration of travel time maps, 8:23049 (R;DE;In German)
Lehr, H., Measurement of coincidences between evaporation residues and fast light particles, 8:24668 (RA;DE;In German)
See Bohne, W., 8:24663, 8:24687
See Morgenstern, H., 8:24662
Leibbrand, W., Use of computers for the documentation of supply lines, 8:23430 (R;DE;In German)
Leibbrandt, G., Lorentz-non-invariant counter-terms in QCD in a general axial gauge, 8:24636 (J;NL)
Leibowitz, L., *See* Fink, J.K., 8:23516
See Green, D.W., 8:24001
Leininger, D., Research on the fundamentals of process control in hard coal preparation, 8:22982 (R;DE;In German)
Leisher, W.B., Grayloc seal static tests, 8:24112 (R;US)
Leistritz, F.L., *See* Murdock, S.H., 8:24303
Lekkerkerker, C.G., *See* Kaper, H.G., 8:24722
Leloup, C., *See* Aymar, R., 8:25207
LeMay, I., DEsign for elevated temperature environmetns: some

current problems and concerns, 8:23924 (RA;US)
Lemoine, M., *See* Dogniaux, R., 8:23247
Lemon, D.K., *See* Hutton, P.H., 8:24142
Lenahan, P.M., Electron spin resonance study of radiation-induced electrically active paramagnetic centers at the Si/SiO_2 interface, 8:24035 (J;US)
Lender, M., *See* Menczel, J., 8:24464
Lentzen, F., *See* Schaerer, B., 8:24240
Lenz, U., *See* Imhausen, K.H., 8:22914
Lepoutre, G., Conversion and chemical storage of solar energy in a photoelectrochemical cell. Final report, 8:23275 (R;US)
Lesniak, M., *See* Spencer, H., 8:24461
Lester, T.W., Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels. Progress report, February 16, 1982-February 15, 1983, 8:24082 (R;US)
Lettau, H., Measurement of the scattering angle at the entrance of the magnetic spectrometer with a position-sensitive parallel-plate avalanche counter, 8:24199 (RA;DE;In German)
Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution, 8:24649 (RA;DE;In German)
Two-dimensional position-sensitive parallel-plate avalanche counter for the magnetic spectrometer, 8:24200 (RA;DE;In German)
See Birkelund, J.R., 8:24686
See Bohlen, H.G., 8:24647, 8:24648, 8:24657
See Flynn, E.R., 8:24658
See Kovar, D.G., 8:24659
See von Oertzen, W., 8:24692
Leung, L., *See* Arthur, A., 8:23824
Levanon, H., Electron-transfer reactions of chlorophyll a and porphyrin triplets with radicals in aqueous micellar solutions, 8:23283 (J;US)
Levatin, J.A., *See* Wilkins, M.L., 8:24567
Leventhal, J.S., Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R;US)
LeVine, F.H., *See* Nerem, A., 8:25090
Levine, M.M., *See* Lu, M.S., 8:23653
Levy, A.J., *See* Simmons, W.W., 8:25140
Levy, M., Corrosion behavior of high density tungsten alloys, 8:23899 (RA;US)
Lewin, G., *See* Mozeleski, M., 8:25206
Lewis, D., On-line laser spectroscopy with a cooled He-jet transport system, 8:24174 (R;US)
Lewis, L.R., *See* Cumming, R.B., 8:24435, 8:24436, 8:24439
Ley, R.D., Immunological detection of two types of cyclobutane pyrimidine dimers in DNA, 8:24392 (J;US)
See Ullrich, R.L., 8:24388
Leygraf, Ch., Photocatalytic production of hydrogen from water by a p- and n-type polycrystalline iron oxide assembly, 8:23211 (J;US)
Li-Aravena, F., *See* Wignall, G.D., 8:24073
Liberman, B., *See* Wu, C.S., 8:24806
Libeyre, P., *See* Aymar, R., 8:25207
Licht, L.A., Refeeding biogas digester solids, 8:23289 (J;US)
Lieb, K.P., *See* Bergmeister, F.J., 8:24665
Lieber, M., *See* Ho, T.S., 8:24528
Lieberg, M., *See* Wang, S.T., 8:23777
Liensu, P.J., Design of the Klamath Falls geothermal district heating network, 8:23386 (J;US)
Lietti, A., R.f. system for Alfven wave heating of the TCA tokamak, 8:24926 (J;US)
Lietzke, A.F., Control of a high-power neutral beam generator by means of arc-current regulation, 8:25105 (J;US)
Lieurance, D.W., EBTR magnet design, 8:25012 (J;US)
Likos, W.E., Effect of low-proof alcohol utilization to supplement diesel fuel on engines life expectancy: Caterpillar 3306 PCI. Final report, 8:23880 (R;US)
Effect of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: International Harvester D436. Final report, 8:23881 (R;US)
Effects of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: John Deere 6466T. Final report, 8:23879 (R;US)
Liley, J.D., *See* Webb, G.L., 8:23911
Lill, G., *See* Holzer, R., 8:23459
Liminga, R., Temperature dependence of the nuclear positions and spontaneous polarization in pyroelectric $Ba(NO_3)_2xH_2O$, 8:24040 (J;US)
Lin, C.D., *See* Fritsch, W., 8:24530, 8:24531
Lin, J.S., *See* Koehler, W.C., 8:24732
Lin, W.H., Acoustic scattering by elastic solid cylinders and spheres in viscous fluids, 8:24753 (J;US)
Lincoln, R.W., *See* Hamilton, W.C., 8:25019
Lindberg, L.J., Oxidation stability of advanced reaction-bonded Si/sub 3/N/sub 4/ materials, 8:24014 (J;US)
Lindenberger, K.H., Observation of giant dipole resonances built on states of high energy, 8:24678 (RA;DE;In German)
Lindner, D.I., *See* Hansen, F.R., 8:23253
Lindquist, W.B., Mirror fusion test facility electrical systems, status and plans, 8:25217 (J;US)
Link, B.W., *See* Miller, R.L., 8:23530
Linkinhoker, C.L., *See* Luton, J.N. Jr., 8:25036
Linkins, A.E., Oil persistence in tundra and its impact on the below-ground ecosystem. Final report, 8:23039 (R;US)
Linkins, D.W., *See* Wang, J.C.F., 8:24242
Linneborn, H., *See* Ide, J., 8:23226
Lior, N., *See* Ozoe, H., 8:23350
Lipa, M., Mechanical aspects of the design of a lower hybrid frequency grill launcher for the Joint European Torus (J.E.T.), 8:25094 (J;US)
Lipkin, H.J., Successes and failures of the constituent quark model, 8:24605 (R;US)
Lippel, P., *See* Chakraborty, B., 8:23939
See Fluss, M.J., 8:23942
Lippens, M., *See* Bairiot, H., 8:23453
Lipperheide, R., Calculation of reaction cross sections for deformed nuclei, 8:24683 (RA;DE;In German, English)
Determination of potentials from the scattering function, 8:24712 (RA;DE;In German, English)
Spin-orbit potentials from reaction calculations of spin-flip, 8:24713 (RA;DE;In German, English)
Lippmann, M.J., *See* Sorey, M.L., 8:23362
Lippold, W.J., Application of extended burnup: a utility perspective, 8:23478 (RA;US)
Lipson, J., *See* Sgro, A.G., 8:24792
Lisser, J., Poloidal-field thyristor amplifier with improved power factor, for TEXTOR, 8:25062 (J;US)
Littell, R.C., *See* Pearl, D.S., 8:24470
Little, N.E., Design of a geothermal district heating system for Boise, Idaho, 8:23387 (J;US)
Liu, C.S., *See* Freund, H.P., 8:24807
See Lau, Y.Y., 8:24791
Liu, H., Economics of Cherepnov water lifter for low-head hydropower, 8:23244 (R;US)
Theoretical and experimental investigation of the Cherepnov water lifter, 8:23243 (R;US)
Liu, M.K., Survey of plume models for atmospheric application, 8:24225 (R;US)
Liu, P.I., *See* McGregor, D.H., 8:24357
Liu, Q.K.K., Microscopic calculations of the transition probability and E2 form factor of ^{7}Li and ^{7}Be, 8:24646 (RA;DE;In German, English)
Reaction model for the description of spin-flip in the inelastic scattering of $^{13}C + {}^{12}C \rightarrow {}^{13}C' + {}^{12}C^*(2^+)$, 8:24645 (RA;DE;In German, English)
Reaction model for the description of spin-flip in the inelastic scattering of $^{13}C + {}^{24}Mg \rightarrow {}^{13}C' + {}^{24}Mg^*(2^+)$, 8:24652 (RA;DE;In German, English)
See Lipperheide, R., 8:24713
Liu, S.H., Theory of photoemission from metallic Ce, 8:23979 (J;US)
Liu, S.N., *See* Dau, G.J., 8:23464
Lo, C., *See* Mulay, L.N., 8:24057
Lobner, P.R., *See* Carlson, D.D., 8:23629
Lochter, M., *See* Braunsberger, U., 8:25029
Lock, S., *See* Dalbey, W.E., 8:24445
Loechter, N., *See* Gruber, G., 8:24543
Loesser, G.D., *See* Heitzenroeder, P.J., 8:25034
Lofgren, E., *See* Carlson, D.D., 8:23629
Logan, B.G., *See* Wong, R.L., 8:24985
Lohmann, J., *See* Ide, J., 8:23226
Lohnert, H., *See* Kunze, R.C., 8:25089
Lohrer, W., *See* Schaerer, B., 8:24240
Lomon, E., Joining the quark and hadron exchange descriptions of strong interactions, 8:24615 (RA;US)
Lomon, E.L., What can be learned from strong elementary hadronic interactions at and below 16 GeV, 8:24622 (RA;US)
Londner, H.D., *See* McCarthy, P.M., 8:23693, 8:23719
Longest, A.W., Boundary effects on Zircaloy-4 cladding deformation in LOCA simulation tests, 8:23651 (J;US)
Longhurst, G.R., Electric power from near-term fusion reactors, 8:24937 (J;US)

Longwell, J.P., Coal pyrolysis by hot dolomitic solids from a fluidized bed combustor, 8:22902 (RA;CA)
Longworth, J.W., Protein luminescence: the end of the beginning, 8:24319 (RA;US)
Look, M., *See* Folstad, L., 8:24326
Loomis, B., *See* Carpenter, J., 8:24171
Lopez de Haro, M., Enskog theory for multicomponent mixtures. I. Linear transport theory, 8:24751 (J;US)
Loring, C.M., Gyrotron - an ECH system component, 8:25121 (J;US)
LoSecco, J., *See* Cortez, B., 8:24597
Lotze, J., *See* Kuehn, L., 8:22944
Lou, K.H., *See* Cooper, W.S., 8:25084
Louthan, M.R. Jr., Environmental degradation of engineering materials in aggressive environments, 8:23895 (R;US)
Louzon, T.J., Sea water corrosion of two-phase Cu-10Ni-8Sn, 8:23897 (RA;US)
Lovell, E.G., *See* Engelstad, R.L., 8:25204
Lowell, C.E., *See* Furman, E.R., 8:23415
Lowndes, D.H., Time-resolved optical studies of silicon during nanosecond pulsed-laser irradiation, 8:24038 (J;US)
Lu, M.C., *See* Young, R.T., 8:23288
Lu, M.S., Analysis of a partial scram event in a typical BWR/4, 8:23653 (J;US)
Lubell, M.S., *See* Shen, S.S., 8:25014
Lubin, A.H., Analysis of tapwater lead concentration in homes of children with undue body lead burden, 8:24300 (J;US)
Lead and iron status of breast and formula-fed infants, 8:24468 (J;US)
Smoking, infant birthweight and lead burden in developing children, 8:24459 (J;US)
Lucas, H.F. Jr., *See* Rowland, R.E., 8:24364
Lucas, R.J., Stability of parallel flow of a multi-component cylindrical plasma to electrostatic perturbations, 8:24804 (J;GB)
Luck, L.B., An improved quasistatic method for transition-phase calculations, 8:23657 (J;US)
Ludewigt, B., *See* Gaul, G., 8:24666
Ludwig, E., *See* von Cube, H.L., 8:23855
Ludwig, H., *See* Wang, S.T., 8:23777
Lue, J.W., *See* Miller, J.R., 8:24126, 8:25051
Luedke, H., *See* Leininger, D., 8:22982
Luger, F., *See* Dauber, E., 8:23849
Luippold, H.E., *See* Preston, R.J., 8:24376
Lundberg, D.A., Atmospheric resource research, 8:23090 (RA;US)
Cultural-economic resource research, 8:23093 (RA;US)
Ecological resource research, 8:23092 (RA;US)
Environmental permits, 8:23095 (RA;US)
Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record, 8:23089 (R;US)
Hydrologic resource research, 8:23091 (RA;US)
Industrial safety and health, 8:23087 (RA;US)
Risk assessment and mitigation, 8:23094 (RA;US)
Lundberg, L., *See* Merrigan, M., 8:24115
Lundquist, G.M., *See* Mellman, G.R., 8:24221
Lundstrom, I., *See* Prejza, J., 8:24075
See Skotheim, T., 8:23286
Lunsford, R.V., Pneumatic hydrogen pellet injector development at Oak Ridge National Laboratory, 8:25118 (J;US)
Luszik-Bhadra, M., 4f spin dynamics for isolated mixed valent Ce ions in Th metal, 8:23967 (RA;DE;In German, English)
See Barth, H.J., 8:23966, 8:24740
Luthy, R.G., *See* Torpy, M.F., 8:23088
Luton, J.N. Jr., Pool boiling superconducting coils for the Large Coil Task, 8:25036 (J;US)
Lutz, H.O., *See* Fritsch, W., 8:24534
See Wille, U., 8:24535
Lutz, T.J., *See* Rack, H.J., 8:23917
Lutze, W., Development of the borosilicate glass for the vitrification plant PAMELA, 8:23127 (RA;DE;In German)
Lyczkowski, R.W., Three-dimensional modeling of thermal and fluid mixing in PWRs during high-pressure coolant injection, 8:23640 (J;US)
Lykoudis, P.S., *See* Gherson, P., 8:24922
Lynch, D.W., *See* Wieliczka, D., 8:23980
Lynch, P., Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces, 8:23901 (RA;US)
Lynch, R.W., *See* Wang, J.C.F., 8:24242
Lynch, S.P., Metallographic and fractographic aspects of liquid-metal embrittlement, 8:23915 (RA;US)
Lynch, W.S., Industrialization and production of neutral beam ion sources for MFTF, 8:25114 (J;US)
Lynen, U., *See* Froebrich, P., 8:24667
Lyness, J.N., Note on cubature over a triangle of a function having specified singularities, 8:25268 (R;US)
Lynn, L.L., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Lyon, L.L., *See* Ullrich, R.L., 8:24388
Lytle, F.W., *See* Meitzner, G., 8:23972
Lytle, J.M., *See* Tingey, G.L., 8:23170

M

Ma, B.N., Conceptual design and material consideration on toroidal CTR first wall, 8:24963 (J;US)
Ma, E., Quark-diagram contribution to K/ sub L/ $\rightarrow \gamma\gamma$, 8:24582 (RA;US)
Maag, C., *See* Ponton, J., 8:24361
Maassen, L.W., *See* Shettel, D.L. Jr., 8:23098
Macal, C.M., *See* Wyant, F.R., 8:23692
Macchi, E., *See* Angelino, G., 8:23865
MacDonald, P.E., *See* Mason, R.E., 8:23496
Macfarlane, P.A., Distribution of ^{226}Ra in the lower paleozoic aquifers of southeast Kansas and adjacent areas, 8:24297 (J;US)
MacFee, L.J., Maintenance glove box for sealed master-slave manipulators, 8:24131 (J;US)
Machanoff, R., *See* Hsie, A.W., 8:24416
Machio, A., *See* Fellin, L., 8:25218
Machiraju, S., *See* Hidy, G.M., 8:24224
Machner, H., Light charged-particle emission from $^{197}Au + ^{20}Ne$, 8:24700 (RA;DE;In German, English)
Mack, J.D., Kinetics of anaerobic decomposition of phenol, 8:22949 (R;US)
Mackor, A., Photocatalytic production of hydrogen from water, using sunlight. Final report, 8:23207 (R;US)
MacLeod, M.C., *See* Selkirk, J.K., 8:24451
MacMahon, A.B., *See* Terry, D.R., 8:25186
Madden, R., *See* Rogers, S., 8:22927
Maddux, A.S., CLAP; linear control system design analysis, 8:24100 (R;US)
Maddux, E.P., *See* Anderson, R.T., 8:23115
Maddux, S.C., *See* Russell, W.L., 8:24424
Mader, C.L., Initiation of propagating detonations, 8:24212 (R;US)
Madland, D.G., *See* Kozlowski, T., 8:24184
Madsen, M.M., RADTRAN II user guide, 8:23117 (R;US)
Madsen, N.K., PDEONE; solutions of partial differential equations, 8:25239 (R;US)
Maeda, H., Lorenz force induced strand motion in a superconducting cable, 8:25040 (J;US)
Maejima, Y., *See* Shimada, T., 8:24948
Maeno, M., *See* Shimada, M., 8:24866
Maguire, J.F., *See* Maeda, H., 8:25040, 8:25040
Mahaffey, K.R., *See* Rader, J.I., 8:24465
Mahajan, S.M., Kinetic theory of Alfven waves, 8:24762 (R;US)
Quasilinear momentum and energy transport, 8:24782 (J;US)
Mahan, B.H., *See* Grieman, F.J., 8:24565
Mahdavi, M.A., Review of the recent expanded boundary divertor experiments in the Doublet III device, 8:24865 (J;NL)
Maher, D.M., *See* Zaluzec, N.J., 8:24046
Mahnke, H.E., *See* Alber, D., 8:24676
See Berger, A., 8:24677
See Bertschat, H.H., 8:23960
See Devare, H.G., 8:23956
See Graef, H., 8:24688
See Stenzel, C., 8:24697
Maier, K.H., *See* Agarwal, Y.K., 8:24689
See Bertschat, H.H., 8:23960
See Decman, D.J., 8:24698, 8:24699
See Stenzel, C., 8:24697
Mainka, E., *See* Hassan, A.M., 8:24049
Maise, G., *See* Fowler, T.B., 8:23581
Majorana, C.E., *See* Schrefler, B.A., 8:24949
Majumdar, S., *See* Smith, D.L., 8:24823, 8:25173
Makens, J., *See* Jess, M., 8:23740
Makimoto, Y., *See* Yamaguchi, K., 8:25124
Makiura, T., *See* Ogasawara, T., 8:25041
Malang, S., *See* Casal, V., 8:23619
Malanify, J.J., Operational advanced materials control and accountability system, 8:23198 (J;US)
Malick, F.S., Mechanical design of a toroidal divertor for EBT-S, 8:24984 (J;US)

Malinauskas, A.P., CONSEPT; controller-run solvent extraction, 8:23110 (R;US)
Manara, A., *See* Lanza, F., 8:24004
Mandelkern, M., *See* Pasierb, E.L., 8:24586
Mangus, J.D., Low chemical concentrating steam generating cycle, 8:23425 (P;US)
Manickam, J., *See* Izzo, R., 8:24768
Maninger, R.C., Environment and safety: major goals for MARS, 8:24846 (R;US)
Mann, A.K., Neutrino oscillations, 8:24584 (RA;US)
Mann, F.M., HAUSER5; nuclear reaction cross sections, 8:24640 (R;US)
Mann, J.B., *See* Carnall, W.T., 8:24078
Mann, M., *See* Goblirsch, G.M., 8:22996
Mann, R.C., *See* Mullaney, P.F., 8:24450
Manny, E.F., An overview of dental radiology: a primer on dental radiology, 8:24390 (R;US)
Mansell, A.G., *See* Walton, L.A., 8:23488
Mansfield, B.K., *See* Selkirk, J.K., 8:24451
Manthey, C., Energy technology data handbook. Vol. 1, 8:23423 (R;DE)
Manzel, R., *See* Stehle, H., 8:23450
Mapel, W.J., Geologic map and coal resources of the Thompson Creek area, Big Horn County, Montana, 8:22966 (R;US)
Maple, M.B., *See* Torikachvili, M.S., 8:24041
Marchaterre, J., *See* Ferguson, D., 8:23591
Marchertas, A.H., Modeling of crackling of sodium-concrete reactions, 8:23641 (J;US)
Marchok, A.C., Induction and progression of neoplasia in tracheal epithelium, 8:24443 (RA;US)
Marcus, R.A., *See* Noid, D.W., 8:24561
Margottini, G., Observation of several large earthquakes with an eastern epicenter. The macroseismic region in Italy of the 1903 Greek earthquake, 8:24488 (R;IT;IT)
Marienfeld, C., *See* Sun, A.Y., 8:24466
Marienfeld, C.J., Ebb and flow of manganese: a possible pathogenic factor in birth defects, cancer and heart disease, 8:24457 (J;US)
Marikos, M., Distribution and possible causes of radionuclides in groundwaters of Missouri, 8:24296 (J;US)
Marinucci, C., Results of the cooldown analysis of the Swiss LCT coil, 8:25054 (J;US)
Markiewicz, W.D., *See* Ballou, J.K., 8:24125
Marks, S., Hanford-worker health study: a status report, 8:24391 (R;US)
Marksberry, L., *See* Zaloudek, F.R., 8:23666
Markun, F., *See* Rundo, J., 8:24362
Marlow, W.H., *See* McGraw, R., 8:24064
Maronde, C.P., *See* Hucko, R.E., 8:22986
Maroni, V.A., *See* Herman, H., 8:24969
See Misra, B., 8:24825
Marriner, J., *See* Johnson, R.P., 8:24194
Marsala, R.J., Low noise, high impedance, dc coupled auto zeroing amplifier for TFTR, 8:25189 (J;US)
Marshall, M.E., *See* Der, Z.A., 8:24494
Marshall, W.F., *See* Clark, C.R., 8:24456
Marston, P.G., *See* Dawson, A.M., 8:23779
Marte, J.E., *See* Redmann, G.H., 8:23614
Martell, C.J., *See* Shettel, D.L. Jr., 8:23098
Martin, A.R., Lower hybrid rf monitoring system for PLT, 8:24954 (J;US)
See Schnabl, F.J., 8:25097
Martin, B., *See* Arndt, P., 8:24161
See Busse, W., 8:24181
Martin, B.K., *See* Barth, R.C., 8:22965
Martin, D.H., *See* Terzaghi, M., 8:24444
Martin, F., *See* Witschi, H.R., 8:24442
Martinelli, A.P., *See* Roth, J., 8:24775
Masiello, P.J., Thermal-hydraulic code qualification: ATHOS2 and data from Bugey 4 and Tricastin 1. Final report, 8:23499 (R;US)
Masker, W.E., Mechanisms of mutagenesis and DNA repair, 8:24311 (RA;US)
Mason, L.S., Challenges of designing fusion reactors for remote maintainability, 8:24950 (J;US)
Mason, P.R., *See* Westlake, D.G., 8:23997
Mason, R.E., Interim report on the TMI-2 purification filter examination, 8:23496 (R;US)
Mass, B., *See* Oicles, J.A., 8:25076
Massmann, J.W., Computer optimization of landfill-cover design, 8:23871 (R;US)
Mast, F., Scaling laws for thermal behavior of inertially cooled limiters allowing for temperature-dependent material properties, 8:24895 (J;NL)
Masuda, M., *See* Kimishima, T., 8:25164
See Miyata, H., 8:24999, 8:25000
See Ohkubo, M., 8:25001
See Shintomi, T., 8:25074
Mathe, P., PDX operating controls, 8:25183 (J;US)
Matheson, J.E., *See* Walton, L.A., 8:23488
Mathis, J.J. Jr., *See* Weber, A.H., 8:24253
Mathur, M.P., *See* Ekmann, J.M., 8:22994
Matsuda, T., *See* Shimada, M., 8:24866
Matsuki, T., *See* Leibbrandt, G., 8:24636
Matsumoto, T., *See* Westlake, D.G., 8:23997
Matsuyama, Y., *See* Takeuchi, H., 8:23975
Mattas, R.F., U.S. INTOR divertor design, 8:25174 (J;US)
See Abdou, M.A., 8:24820
See Evans, K. Jr., 8:24817
See Smith, D.L., 8:24823, 8:25173
Mattox, D.M., Advanced materials for in-vessel components, 8:24902 (J;NL)
Mattson, E., Canister materials proposed for final disposal of high level nuclear waste, 8:23144 (RA;DE)
Matushita, T., *See* Kobayashi, S., 8:25059
Matzie, R., *See* Freeman, R., 8:23494
Maule, P.A., *See* Wade, J.E., 8:23388
Maupin, M.K., *See* Masker, W.E., 8:24311
Maurer, W., *See* Komarek, P., 8:24116
See Yang, T.F., 8:25134
Maxwell, R.L., *See* Wyant, F.J., 8:23550
May, F.R., *See* Leander, G.A., 8:24704
Maya, I., *See* Hopkins, G.R., 8:24934
Mayer, E., *See* Kuenzel, H., 8:23798
Mayer, F.J., Simple ablative implosion model: shell dynamics, 8:24849 (J;US)
Mayer, P., *See* Thorpe, S.J., 8:23910
Mayer, W., *See* Hartung, 8:23304
Mayer, W.A., *See* Bohn, H., 8:24202
Mayercheck, W.D., Continuous haulage update, 8:22972 (R;US)
Mayfield, G.L., Removable, hermetically-sealing, filter attachment system for hostile environments, 8:23552 (P;US)
Maywald, C., *See* Scheer, J., 8:24048
Mazarakis, M.G., Intense electron-beam autogenerator, 8:24169 (R;US)
See Miller, R.B., 8:24187
Mazumdar, M., Comparison of algorithms for computing generating-system reliability indexes. Final report, 8:23745 (R;US)
Mazur, P., Theoretical and applied cryobiology, 8:24397 (RA;US)
Mazzocco, N.J., *See* Rogers, S.E., 8:22916
McArthur, D.A., Preliminary results of the first four TRAN fuel freezing experiments, 8:23649 (J;US)
McCaig, I.W., Opportunities for pyrolysis technology in producing gas and combustible residues for use in electric power generation, 8:22909 (RA;CA)
McCann, C.R., *See* Ekmann, J.M., 8:22994
McCart, B.R., *See* Westlake, D.G., 8:23997
McCarthy, P.M., Pacific Northwest regional energy planning module III: policy options and programs. Development of standards and program packages. Volume I. Summary. Final report, Phase 2, 8:23693 (R;US)
Pacific Northwest regional energy planning Module III: policy options and programs. Development of standards and program packages. Volume II. Technical report. Final report, Phase 2, 8:23719 (R;US)
McClanahan, E.D., *See* Tingey, G.L., 8:23170
McClean, P.M., *See* Manny, E.F., 8:24390
McClellan, R.O., *See* Clark, C.R., 8:24456
McClements, W.L., *See* Vande Woude, G.F., 8:24338
McClenahan, M.R., *See* Wade, J.E., 8:23388
McClintock, F.A., *See* Argon, A.S., 8:23950
McClung, J.D., *See* Podolski, W.F., 8:24150
McClurg, J.E., *See* Youngberg, A.D., 8:22923
McClurkin, J.L., Role of mockup testing in the Hot Fuel Examination Facility remote operations, 8:24103 (R;US)
McConnell, J.W., EPICOR-II resin/linear research plan, 8:23608 (R;US)
McCorkle, D.L., Interaction of slow electrons with high-pressure gases ('Quasi-liquids'): synthesis of our knowledge on slow electron-molecule interactions. Progress report, 8:24526 (R;US)
See Christodoulides, A.A., 8:24525
See Christophorou, L.G., 8:24524
See Hunter, S.R., 8:24523
McCown, D.L., *See* Paddock, R.A., 8:23427
McCracken, G.M., Global estimates of impurity levels and wall erosion in INTOR, 8:24869 (J;NL)
Surface interactions in a reverse field pinch, 8:24887 (J;NL)
McCrary, G.E., *See* McCrary, J.H., 8:23255
McCrary, J.H., Solar thermochemical energy conversion and transport. Final report 15 Mar 77-30 Sep 82, 8:23255 (R;US)
McDade, J.C., Description of the molding system for the epoxy impregnation of

the TFTR poloidal field coils, 8:25021 (J;US)
Mcdonald, C.A., *See* Foster, J.S., 8:23753
McDonald, T.A., *See* Kennedy, M.F., 8:23600
McElroy, D.L., *See* Fine, H.A., 8:23834
McElroy, P.M., Weathering of sheet molding compounds, 8:24018 (RA;US)
McFarland, B.L., STESEP; solar total energy system evaluation, 8:23297 (R;US)
McFarland, N.J., *See* Cash, D.J., 8:24489
McFarlane, W.K., Searching for structure in nucleon-antinucleon interactions near threshold, 8:24592 (RA;US)
See Highland, V.L., 8:24583
McGahan, J., *See* Goetz, J., 8:24359
McGee, T.D., *See* Bray, D.J., 8:22938
McGhee, D.G., *See* Kim, S.H., 8:25052
See Praeg, W.F., 8:24970
McGoldrick, P.R., BASIC2 INTERPRETER; minimal basic language, 8:25243 (R;US)
McGrath, R.T., *See* Brooks, J.N., 8:25166
McGraw, R., Multistate kinetics of nucleation in the presence of an aerosol, 8:24064 (J;US)
McGregor, D.H., Breast cancer among atomic bomb survivors, Hiroshima and Nagasaki, 1950-1969. Pathologic features, 8:24357 (R;US)
McGuigan, D.L., *See* Suski, G.J., 8:25151
McGuire, J.H., Second Born calculation for electron capture, 8:24529 (RA;DE;In German, English)
McGuire, K., *See* Izzo, R., 8:24768
Mcguire, P.L., *See* Barraclough, B.L., 8:23020
McGuire, W., *See* Trautmann, C.H., 8:23437
McHenry, H., *See* Wang, S.T., 8:23778
McHugh, J.P., *See* Duncan, C.S., 8:23267
McHugh, S., Scale modeling of turbine-missile impact into concrete. Final report, 8:23611 (R;US)
McInnes, R.A., *See* Sella, G.E., 8:24472
McInteer, C., *See* Hardy, L.C., 8:23100
McIntosh, G.E., *See* Eyssa, Y.M., 8:25030
McKee, R.J., Investigation of pulsation in slurry-pumping systems in coal-liquefaction plants. Final report, 8:22929 (R;US)
McKee, R.W., Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository, 8:23166 (R;US)
McKellar, B.H.J., Quark-tadpole transitions and the $\Delta I = (1/2)$ rule in K decays, 8:24627 (J;US)
McKelvey, T.E., Doublet III vessel wall protection for 7 MW neutral beam heated plasma operation, 8:24968 (J;US)
McKenzie-Wilson, R., *See* Larson, R., 8:24928
McKinley, T.W. Jr., *See* Selby, P.B., 8:24331, 8:24383, 8:24428, 8:24429
McLain, F.W., Stability of Doublet III plasmas against axisymmetric resistive MHD modes, 8:24913 (J;GB)
McLarnon, F.R., *See* Katz, M.H., 8:23679
McLaughlin, D.W., Breather annihilation by simple dissipation, 8:24755 (J;US)
McLaughlin, T.B., TMI-2 core-examination program: INEL facilities readiness study, 8:23607 (R;US)
McLennan, G.A., *See* Ash, J.E., 8:23644
See Cha, B.K., 8:23514
McManamy, T.J., *See* Gray, W.H., 8:25017
McMaster, D.J., *See* Lambright, W.H., 8:24304, 8:24305
McMasters, O.D., *See* Johanson, W.R., 8:23947
McMurray, R., *See* Fritsch, W., 8:24534
McNeese, L.E., Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R;US)
McNitt, R.P., *See* Louthan, M.R. Jr., 8:23895
McPherson, L., *See* Zandt, G., 8:23370
McRae, T.G., BAGI: a technique for the detection and tracking of large gas clouds, 8:23070 (R;US)
See Koopman, R.P., 8:23069
McShane, M.C., *See* Beedlow, P.A., 8:23172
McWhan, D.B., *See* Cox, D.E., 8:24044
Mecholsky, J.J., *See* Costin, L.S., 8:24500
Medeiros, W.H., *See* Moskowitz, P.D., 8:24306
Medved, D.L., *See* McElroy, P.M., 8:24018
Meek, C.C., Fuel - cladding gap conductance measurements using Kalman filter methods, 8:23546 (J;US)
See Bauer, T.H., 8:23588
Meguro, S., *See* Furuto, Y., 8:25020
Mei, J.S., Oil shale retorting and combustion system, 8:23083 (P;US)
Meier, B., Improved program for the determination of neutron efficiency of large Self Powered Neutron Detectors taking into account charge carrier production in the insulator, 8:24204 (R;DE;In German)
Meisel, M.W., *See* Roach, P.R., 8:24570
Meisler, M.H., *See* Chu, E.H.Y., 8:24366
Meitzner, G., Structure of bimetallic clusters. Extended x-ray absorption fine structure (EXAFS) studies of Ir—Rh clusters, 8:23972 (J;US)
Melehan, J.B., *See* Wilson, H.W., 8:23475
Melin, G., *See* Lipa, M., 8:25094
Mellman, G.R., Investigations of near-source structural effects on body waves. Part II. Yucca Flats; receiver functions appropriate to NTS; motive functional specifications. Annual technical report, 8:24221 (R;US)
Mellor, J.E., *See* Weaver, H.J., 8:24839
Memmert, G., Evaluation of the barriers in an ultimate storage for radioactive waste, 8:23143 (RA;DE;In German)
Mencsel, J., Effect of starvation on ^{65}Zn tissue distribution and excretion by rats, 8:24464 (J;US)
Mendelsohn, M.H., Hydrides of oxygen-stabilized intermetallic phases, 8:23998 (R;US)
Hydrogen absorption and temperature programmed desorption (TPD) studies of iron- and chromium-substituted ZrV_2, 8:23214 (R;US)
See Gruen, D.M., 8:23216, 8:24521, 8:24904
Mendler, O.J., *See* Hopkins, G.W., 8:23501, 8:23502, 8:23503
Meng Ta Chung, *See* Gross, D.H.E., 8:24691
Menghini, S., *See* Cesari, F., 8:23515
Menke, J.L., *See* Reierson, J.D., 8:24936
Menningen, M., *See* Bertschat, H.H., 8:23958
See Devare, H.G., 8:23956
Menon, M.M., Status and trends in the development and application of positive-ion-based neutral injectors, 8:25112 (J;US)
Menyuk, C.R., Effect of a transition between regular and stochastic electron motion on the evolution of an obliquely propagating Langmuir wave, 8:24783 (J;US)
Menzies, K.T., *See* Thayer, P.S., 8:24453
Meranger, J.C., State-of-the-art of commercially available personal monitors for NO/sub x/, SO_2 and particulate matter in ambient air, 8:24246 (J;US)
Mercer, J.E., Development of a quiet Stirling cycle multi-fuel engine for electric power generation. Final report Feb-Aug 82, 8:23397 (R;US)
Merkle, K.L., *See* King, W.E., 8:23935, 8:23948
Merklin J.F., *See* Lester, T.W., 8:24082
Merrigan, M., Heat pipe development for high temperature recuperator application, 8:24115 (J;GB)
Merrill, B., *See* Smith, D.L., 8:24823
Merrill, B.J., INTOR first wall erosion during plasma disruption, 8:24964 (J;US)
Modeling the thermodynamic response of metallic first walls during a plasma disruption, 8:24891 (J;NL)
Merritt, B.T., 2.0 MVA voltage doubler power supply for capacitor bank charging, 8:25068 (J;US)
See Whitham, K., 8:25143, 8:25144
Mertins, H., *See* Knowles, T.R., 8:23954
Merx, E., Overview on product forms, 8:23126 (RA;DE;In German)
Meshenberg, M.J., *See* Kron, N.F. Jr., 8:23703
Meshii, M., *See* King, W.E., 8:23935, 8:23948
Messemer, G., *See* Zehlein, H., 8:25013
Messerly, C.D., Solar-energy-system performance evaluation: Washington Natural Gas Company, Kirkland, Washington, January 1979-March 1979, 8:23330 (R;US)
Messiaen, A.M., *See* Noterdaeme, J.M., 8:25093
Mestayer, M.D., Ratio σ/sub L//σ/sub T/ from deep-inelastic electron scattering, 8:24602 (J;US)
Metcalfe, L.J., CONTEMPT4/MOD2; multicompartment containment, 8:23584 (R;US)
Metzner, H., Investigation of interstitial trapping at the PAC probe ^{100}Pd in niobium, 8:23964 (RA;DE;In German)
Meuser, R., *See* Taylor, C., 8:24117
Meyer, A.G., Development and integration of operational planning models for the coal mining industry in the Federal Republic of Germany (short title: Mining planning models), 8:22971 (R;DE;In German)
Meyer, T.O., Velocity perturbation of a flyer approaching a rigid impermeable barrier and the transmitted pressure pulse, 8:24214 (R;US)
Meyerson, B.S., Preparation of in situ doped hydrogenated amorphous silicon by homogeneous chemical vapor deposition, 8:24036 (J;US)
Mezzanotte, D.A. Jr., *See* Caskey, G.R. Jr., 8:24911

Mezzina, A., *See* England, C., 8:23667
Miao, C.C., *See* Lyczkowski, R.W., 8:23640
See Shah, V.L., 8:23542
Michaelsen, R., *See* Arndt, P., 8:24161
See Busse, W., 8:24181
See Kantus, R., 8:24679
Michel, D.J., Environmental effects on elevated temperature fatigue crack propagation in Type 316 stainless steel for fusion reactor applications, 8:23922 (RA;US)
Miczaika, A., *See* Flynn, E.R., 8:24658
Middleton, C., *See* Sun, A.Y., 8:24466
Mighdoll, P., Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R;US)
Mika, R., PDX diagnostic control system, 8:25185 (J;US)
Mikhlin, J.A., An overview of coal liquefaction, processes with special reference to the pyrolysis of eastern Canadian coals, 8:22907 (RA;CA)
See Cooke, N.E., 8:22934
Mikula, P., *See* Rodwell, P., 8:22967
Milanovich, F., *See* Klainer, S.M., 8:24294
Miles, K.J., *See* Wider, H.U., 8:23592
Milewski, J.V., Production and characterization of beta-silicon carbide and alpha-silicon nitride whiskers for ceramic matrix composites, 8:24005 (R;US)
Miley, G.H., *See* Fang, Q.T., 8:25080
See Olson, R.E., 8:24940
See Zediker, M.S., 8:25154
Millar, M., Socio-technical scenarios for long-range transportation technology comparisons, 8:23841 (R;US)
See Kaplan, M.P., 8:23843
Miller, A.H., *See* Notis, C., 8:23394
Miller, C.A., Application of reduction methods to nuclear power plant structures, 8:23634 (R;US)
Miller, C.F., *See* Cox, N.D., 8:25234
Miller, D.B., Metal-oxide surge arresters for gas-insulated systems, Phases I and II. Final report, 8:23438 (R;US)
Miller, G.J., *See* Sharp, J.K., 8:23307
Miller, J.A., *See* Kee, R.J., 8:24137
Miller, J.E., *See* Irving, P.M., 8:24406
Miller, J.F., Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program, 8:23676 (R;US)
Miller, J.R., Design, construction, and test of a 113-mm bore solenoid with NbTi cable-in-conduit superconducting windings, 8:24126 (J;US)
Tests of the first development coils for EBT-P, 8:25051 (J;US)
Miller, J.S., In-situ combustion project at Bartlett, Kansas. Final report, 8:23016 (R;US)
Miller, L.G., *See* Longhurst, G.R., 8:24937
Miller, P.H. Jr., *See* Baur, J.F., 8:24810
Miller, R.B., IBEX foilless diode experiments, 8:24187 (R;US)
See Mazarakis, M.G., 8:24169
See Prestwich, K.R., 8:24185
Miller, R.E., *See* Edwards, R.H., 8:23869
Miller, R.L., Conceptual design studies of the Modular Stellarator Reactor (MSR), 8:24932 (J;US)
Evaluation of nuclear-facility decommissioning projects, Enrico Fermi-1 reactor, 8:23530 (R;US)
Miller, R.S., *See* Smith, M.L., 8:23491
Miller, W.E., Performance of a 10-cell LiAl/metal sulfide battery, 8:23672 (R;US)
Miller, W.H., *See* Hubbard, L.M., 8:24549
Milora, S.L., *See* Lunsford, R.V., 8:25118
Minkoff, M., *See* Fowler, T.B., 8:25264
See Leaf, G.K., 8:24569
Minkov, V., *See* Berry, G., 8:23772
Minor, E.G., Tools and methods for the implementing the control system on the mirror fusion test facility, 8:24953 (J;US)
Minor, M.M., *See* Hardy, L.C., 8:23100
Mioduszewski, P., Experimental studies on pump limiters, 8:24850 (J;NL)
See Simpkins, J.E., 8:24903
See Wooton, A.J., 8:24879
Miscoe, A.J., Engineering approaches to the development of hydraulic transport, 8:24107 (R;US)
Misfeldt, I., *See* Ainscough, J.B., 8:23489
Mishima, K., *See* Shibata, T., 8:23604
Misra, A.K., Thermodynamics of molten sulfate mixtures, 8:24066 (J;US)
Misra, B., Analysis of the separation of protium from blanket tritium-product streams, 8:24825 (R;US)
See Mattas, R.F., 8:25174
See Morgan, G.D., 8:24956
Mistry, D.K., Coal-feeder development. First quarterly technical progress report, October-December 1980, 8:22924 (R;US)
Mitchell, R.D., BECKDRY; dry cooling for steam-electric plants, 8:23398 (R;US)
Mitina, S., *See* Green, M.A., 8:24121
Mitra, S., Structural aspects of DNA in its replication and repair, 8:24310 (RA;US)
Mix, T.W., Potential for cogeneration in distillation. Final report, 8:23863 (R;US)
Miyahara, A., Review of the plasma-material interaction problems for reacting and burning plasma experiments, 8:24796 (J;NL)
See Kawamura, T., 8:24876
Miyata, H., Fatigue design of the poloidal field coil for JT-60 tokamak machine, 8:25000 (J;US)
Nonlinear stress analysis of the poloidal field coil for JT-60 tokamak machine, 8:24999 (J;US)
Miyauchi, Y., *See* Shimizu, M., 8:24927
Mizuno, K., Ion heating due to parametrically driven ion wave turbulence, 8:24778 (J;US)
Mobbs, S.F., *See* De Marsily, G., 8:23178
Mochel, P.E., *See* Zaluzec, N.J., 8:24046
Mochizuki, O., *See* Ogata, A., 8:25198
Moebs, N.N., Relation of geology to mine roof conditions in the Pocahontas No. 3 coalbed. Information circular/1982, 8:22981 (R;US)
Moed, B.A., *See* Smith, A.R., 8:23148
Moehring, K., *See* Gross, D.H.E., 8:24708
Mogard, H., *See* Hollowell, T.E., 8:23483
Mogenstern, H., *See* Bohne, W., 8:24675
Mohapatra, R.N., Spontaneous breaking of global B-L symmetry and matter-antimatter oscillations in grand unified theories, 8:24632 (J;US)
Mohn, U., Process for removing sulfur oxides from gases with direct production of a usable finished reaction product, 8:22943 (R;DE;In German)
Mohr, C.L., COVE1; creep collapse for oval fuel pin tube, 8:23555 (R;US)
Mohrenweiser, H.W., *See* Chu, E.H.Y., 8:24366
Moir, R.W., Fission-suppressed hybrid reactor: the fusion breeder, 8:24838 (R;US)
Molvig, K., *See* Beasley, C.O. Jr., 8:24780
Mondino, P.L., *See* Helgesen, H., 8:25061
Montano, W.B., *See* Hirshfeld, D.S., 8:23035
Montgomery, A.G., *See* Shanfield, S.R., 8:24124
Montgomery, C.S., *See* Russell, L.B., 8:24332, 8:24333, 8:24335, 8:24336, 8:24426, 8:24427
Montgomery, D.B., Engineering feasibility challenges for the magnet community, 8:25033 (J;US)
Monticello, D.A., *See* Izzo, R., 8:24768
Moo, W., *See* Faulkner, F.K., 8:25077
Mook, H., *See* Sinha, S.K., 8:23996
Moore, C.A., *See* Massmann, J.W., 8:23871
Moore, D.S., *See* Valentini, J.J., 8:24558
Moore, E.B. Jr., Development and characterization of electric power conservation and supply resource planning options, 8:23717 (R;US)
Moore, G.E., *See* Liu, M.K., 8:24225
Moore, J., *See* Blanchard, R., 8:24265
Moore, J.G., FUETAP concrete - an alternative radioactive waste host, 8:23131 (RA;DE)
Moos, H.W., *See* Stratton, B.C., 8:24770
Moran, J.A. Jr., Increasing pipe-cable section lengths. Final report, 8:23436 (R;US)
Moran, T.P., *See* Williams, M.D., 8:23563
Morari, M., Flexibility and resiliency of process systems, 8:23029 (R;US)
General framework for the assessment of dynamic resilience. Part II. An application, 8:23860 (R;US)
General framework for the assessment of dynamic resilience. Part I. Theory, 8:24106 (R;US)
Moravcsik, M.J., *See* Goldstein, G.R., 8:24637
Morelli, C., *See* Giese, P., 8:23374
Moretti, C., *See* Neufeld, R.D., 8:22925
Morford, R.J., *See* Burke, R.J., 8:24979
Morgan, C.B., *See* Crawford, R.K., 8:24172
Morgan, D.L., PROMSYS; programmed equipment maintenance, 8:24094 (R;US)
Morgan, D.L. Jr., SLAB: a time-dependent computer model for the dispersion of heavy gases released in the atmosphere, 8:23068 (R;US)
Morgan, G.D., Conceptual design of tritium breeding blanket for INTOR, 8:24956 (J;US)
Design of actively cooled limiters for Alcator A and C, 8:25210 (J;US)
See Mattas, R.F., 8:25174
Morgan, L.G., *See* Burger, L.L., 8:25126
Morgan, M.T., *See* Moore, J.G., 8:23131
Morgan, P.E.D., *See* Jantzen, C.M., 8:23134, 8:23181
Morgan, T.O., *See* Sasscer, D.S., 8:23310
Morgenstern, H., Incomplete momentum transfer in fusion reactions, 8:24662 (RA;DE;In German)
See Bohne, W., 8:24663

See Kovar, D.G., 8:24661
See Lehr, H., 8:24668
Mori, K.K., *See* Heisler, M.P., 8:23508
Moriarty, K.J.M., *See* Creutz, M., 8:24635
Moriya, M., Ferromagnetic porous plastics, 8:24023 (TG;US)
Morlevat, J.P., Compared quantitative determination of nuclear waste glass crystallization rate by light microscopy and X-ray diffraction, 8:23132 (RA;DE)
Morris, E.E., *See* Wider, H.U., 8:23592
Morris, L.K., *See* Morgan, D.L. Jr., 8:23068
Morris, P.A., *See* Bauman, D.S., 8:23419
Morris, R.W., *See* Brannon, P.J., 8:24007
Morris, S.C., *See* Moskowitz, P.D., 8:24306
Morrison, D., *See* Grunes, H., 8:23324
Morse, C.C., *See* Mitra, S., 8:24310
See Witschi, H.R., 8:24442
Mortensen, G.A., *See* Cordes, G.A., 8:23613
Morton, J.W., *See* Gritton, D.G., 8:25150
Moser, H., *See* Klotz, D., 8:24263
Moses, C.A., *See* Likos, W.E., 8:23879, 8:23880, 8:23881
Moses, G.A., High target gain to ICF reactor - a problem of repetition, 8:25137 (J;US)
See Peterson, R.R., 8:24920
Moskowitz, J.W., New look at correlations in atomic and molecular systems. I. Application of fermion Monte Carlo variational method, 8:24564 (J;US)
Moskowitz, P.D., Oxidant air pollution: estimating economic effects on US vegetation. Paper 81.2.2, 8:24306 (J;US)
Photovoltaic energy systems: environmental concerns and control technology needs, 8:23277 (R;US)
Mostafa, M., *See* Hassan, A.M., 8:24049
Motes, B.G., *See* Krupa, J.F., 8:24249
Moulton, D.S., *See* Johnson, I., 8:24148
Mozeleski, M., Bakeable optical windows for the tokamak fusion test reactor, 8:25206 (J;US)
Mrazek, F.C., *See* Battles, J.E., 8:23683
Muckerman, J.T., Applications of classical trajectory techniques to reactive scattering, 8:24566 (J;US)
Mueller, E.R., *See* Bein, B.K., 8:24892
Mueller, H.G., Symmetry of an indium-vacancy complex in coldworked aluminium, 8:23961 (RA;DE;In German)
See Butt, R., 8:23962
Mueller, K., *See* Hoffmann, R., 8:24544
Mueller, K.G., *See* Ehrich, H., 8:24888
Mueller, M.H., *See* Westlake, D.G., 8:23997
Mufti, A.A., *See* Qadir, A., 8:24505
Mukame, S., *See* Gross, D.H.E., 8:24708
Mulay, L.N., Transmission and backscatter Moessbauer spectroscopy of zeolite Fe (and Fe-Co) synfuel catalysts, 8:24057 (R;US)
Mulcahy, T.M., Tube crossflow force measurements, 8:23541 (R;US)
Mullaney, P.F., Cytometrics, 8:24450 (RA;US)
Mullendore, A.W., *See* Pontau, A.E., 8:24854
See Whitley, J.B., 8:24910
Muller, A.C., *See* Forsyth, E.B., 8:23432
Muller, C.H. III, Laser-fluorescence measurements of hydrogen and metal densities in the Doublet III tokamak, 8:24763 (R;US)
Mulroy, R.T., *See* Hackley, D.S., 8:25045
Mulvaney, J.J., R and D benefits assessment - a regional approach, 8:23746 (R;US)
Mund, K., 20 kW-fuel cell units by compact assembly. Pt. 4, 8:23787 (R;DE;In German)
Munford, J.W., *See* Rack, H.J., 8:23917
Munir, Z.A., *See* Thompson, R.J., 8:24043
Munson, F.H., *See* Den Hartog, P.K., 8:24159
Munzert, K.H., *See* Reiter, R., 8:24232
Murai, K., *See* Suzuki, Y., 8:25177
Murakami, Y., Development of low-Z surface coatings for JT-60 first wall, 8:24908 (J;NL)
See Nakamura, K., 8:24906
See Yamada, R., 8:24907
Murali, J., *See* Webb, G.L., 8:23911
Muralidharan, R., *See* Baron, S., 8:23558
Murarka, I.P., *See* Sharma, R.K., 8:23409
Murch, G.E., Chemical diffusion in a one dimensional lattice with two sites inequivalent, 8:24045 (J;GB)
Murdock, S.H., Methods for assessing the socioeconomic impacts of large-scale resource developments: implications for nuclear repository siting, 8:24303 (R;US)
Murphie, W.E., Projected national and world benefits to the LWR fuel cycle from extended burnup, 8:23533 (RA;US)
Murphy, *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Murphy, C.E., POLUTE; forest air pollutant uptake model, 8:24301 (R;US)
TRITMOD; advection model of tritium dispersion, 8:24261 (R;US)
Murphy, D.P., Electron beam transport through the atmosphere in reduced-density, current-carrying channels, 8:25153 (J;US)
Murphy, D.W., *See* Cox, D.E., 8:24044
Murphy, M., Overview of DOE gyrotron development program, 8:25120 (J;US)
Murphy, M.J., Shaped-charge penetration in concrete: a unified approach, 8:24218 (R;US)
Murray, C.N., *See* De Marsily, G., 8:23178
Murray, H.A., Cable information retrieval program, 8:25106 (J;US)
Murray, J.E., Nova front end subsystem, 8:25145 (J;US)
Murray, J.G., *See* Bronner, G., 8:25071
See Gorker, G.E., 8:24962
Murty, K.L., Effect of neutron irradiation on dynamic fracture toughness of A533 Grade B Class 1 pressure vessel steel , 8:23919 (RA;US)
Myall, J.O., *See* Pedrotti, L.R., 8:24845
Myers, D.W., *See* Bliss, E.S., 8:25146, 8:25147
Mykles, D.L., *See* Skinner, D.M., 8:24317
Myles, K.M., *See* Johnson, I., 8:24148
See Wilson, W.I., 8:24149
Myllrole, A.A., Effects of supplemental mangesium on blood and tissue lead levels and toxicity of ingested lead in the rat, 8:24469 (J;US)
Myron, H.W., *See* Arko, A.J., 8:23888

N

Nagami, M., *See* Shimada, M., 8:24866
See Shinya, K., 8:25058
Nagao, A.R., *See* James, S.D., 8:23669
Nagel, R., *See* Adler, H.I., 8:24380
Nagy, W., *See* Reddan, W., 8:25199
Nahemow, M.D., *See* Easoz, J.R., 8:25216
Naill, R.F., Energy projections for the National Energy Policy Plan, 8:23716 (J;US)
Nainiger, J.J., *See* Furman, E.R., 8:23415
Nairn, A.C., *See* Greengard, P., 8:24477
Naito, T., Design study of fuel circulating system using Pd alloy membrane isotope separation method, 8:23199 (RA;JP)
Nakamura, H., *See* Kimishima, T., 8:25164
See Murakami, Y., 8:24908
See Shimizu, M., 8:24927
Nakamura, K., Thermal shock testing of low-Z coatings for JT-60, 8:24906 (J;NL)
See Yamada, R., 8:24907
Nakamura, S., *See* Ninomiya, M., 8:23133
Nakamura, S.Y., *See* Pasierb, E.L., 8:24586
Nakano, Y., Monte Carlo simulation of diffusion of gases in a porous solid: Calculations for a new class of solids, 8:24742 (J;US)
Nakashima, H., Nuclear design of Heliotron fusion reactor blankets (II), 8:24974 (J;US)
Nakayama, P.I., *See* Cook, J.L., 8:23509
Naman, T.M., *See* Clark, C.R., 8:24456
Nash, D.R., *See* Hackley, D.S., 8:25045
Nasu, S., *See* Finn, P.A., 8:24959
Nathan, O., *See* Christensen, P.R., 8:24690
Naundorf, V., *See* Wagner, W., 8:23943
Nazareth, J.L., OCOPTR;DRVOCR; unconstrained optimization, 8:25233 (R;US)
Neel, J.V., *See* Chu, E.H.Y., 8:24366
Nefkens, B.M.K., Relation between $d\sigma$ ($p + d \rightarrow {}^3He + \gamma$) and $d\sigma$ ($p + d \rightarrow {}^3He + \pi^0$) at intermediate energy based on isobar dominance, 8:24611 (RA;US)
Neidig, A., *See* Fahrner, W.R., 8:24208
Neill, D.R., Wind-energy battery-storage project. Phase I. Final report, 8:23396 (R;US)
Neilson, R.M. Jr., *See* Clark, D.E., 8:23118
Nelin, K., TEXT poloidal field power systems operation, 8:25026 (J;US)
See Brower, D., 8:24944, 8:25027
Nelson, P.A., Batteries for electric vehicles, 8:23885 (R;US)
Batteries for load leveling, 8:23408 (R;US)
See Horowitz, J.S., 8:23360
Nelson, S.H., Mission analysis of second cars to determine electric-vehicle suitability, 8:23883 (R;US)
Nelson, W.D., *See* Gorker, G.E., 8:24962
Nemeth, D.M., Resource-recovery option in solid-waste management: a review

guide for public officials, 8:23875 (R;US)
Neren, A., Doublet III neutral beam power system, 8:25090 (J;US)
Neri, A., *See* Ferro, C., 8:24897
Nesbitt, J.F., *See* Smith, R.I., 8:23162
Nestler, E.J., *See* Greengard, P., 8:24477
Neta, P., *See* Levanon, H., 8:23283
Netz, G., *See* Barth, H.J., 8:23966, 8:24740
See Luszik-Bhadra, M., 8:23967
Neufeld, R.D., Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R;US)
See Mack, J.D., 8:22949
Neuls, A.S., Los Alamos Controlled Air Incinerator for radioactive waste. Volume I. Rationale, process, equipment, performance, and recommendations, 8:23147 (R;US)
Neumeyer, C., *See* Faulkner, F.K., 8:25077
Nevinski, D.E., DOE/GE/NSP extended burnup program, 8:23451 (RA;US)
Newcomb, W.A., Equilibrium and stability of collisionless systems in the paraxial limit, 8:24802 (J;GB)
Newman, E., Sources of separated isotopes for nuclear targetry, 8:23200 (BA;US)
Newman, J., *See* Redey, L., 8:23674
Newman, J.S., Fire tests in ventilated rooms: detection of cable-tray and exposure fires, 8:23420 (R;US)
Newman, L.W., Burnable poisons for extended burnup fuel management: present and future, 8:23492 (RA;US)
Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982, 8:23473 (R;US)
Newman, R.A., *See* Turitzin, N.M., 8:25067
Newman, S.S., *See* Dumont, J.N., 8:24419
Newman, W., *See* Bowen, N., 8:25123
Newman, W.G., *See* Schnabl, F.J., 8:25097
Newmyer, J.M., *See* Neuls, A.S., 8:23147
Newton, A.A., *See* McCracken, G.M., 8:24887
Newton, I.O., *See* Lindenberger, K.H., 8:24678
Newton, R.A., Using cognitive modeling to improve the man-machine interface, 8:23561 (RA;US)
Newton, R.M., Distribution and characteristics of surficial geologic materials in the ILWAS watershed, 8:24282 (RA;US)
Ng, D.S., *See* Pedrotti, L.R., 8:24845
Nichols, F.A., Radiation effects in metallic alloys, 8:23918 (RA;US)
Nicklow, R., *See* Chen, S., 8:24730
Niclauss, M., *See* Caemmerer, D., 8:23223, 8:23224
Nicolai, A., Transport code calculations on the particle and energy unloading through overlapping magnetic islands, 8:24873 (J;NL)
See Reiter, D., 8:24874
Nicolich, R., *See* Giese, P., 8:23374
Nielson, K.K., *See* Thamer, B.J., 8:23097
Niemczyk, T.M., *See* Walters, E.A., 8:22960
Nietert, R.E., Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets, 8:24840 (R;US)
Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets, 8:24841 (R;US)
Nilsson, B., *See* Eyssa, Y.M., 8:25030
Nilsson, E.T., *See* Kaminsky, E.L., 8:25116
Ninomiya, H., *See* Shinya, K., 8:25058
Ninomiya, M., Diopside glass-ceramic material for the immobilization of radioactive wastes, 8:23133 (RA;DE)
Ninomiya, Y., Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ;US)
Nishi, M., *See* Abe, M., 8:25181
See Ando, T., 8:25018
Nishikawa, M., *See* Kasai, M., 8:24935
See Shimada, M., 8:24866
Nishimura, H., Beam trajectories calculation code for ion source in neutral beam injector, 8:25085 (J;US)
Nishio, T., *See* Ohkubo, M., 8:25001
Nishitani, T., *See* Ogata, A., 8:25198
Nitzel, M.E., SUPAN; analysis of beam-type piping supports, 8:23400 (R;US)
Nix, C.E., *See* Epler, J.L., 8:24415
Niyogi, S.K., Control of transcription in animal viral systems, 8:24313 (RA;US)
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA;US)
Nock, H.P., Potential of organic residues for the production of basic chemical compounds. Pt. 2, 8:23850 (R;DE;In German)
Noda, N., Wall conditioning of the JIPP T-II torus by AC discharge cleaning, 8:24883 (J;NL)
See Gomay, Y., 8:24860
See Sakamoto, Y., 8:24880
Noda, T., *See* Finn, P.A., 8:24959
Noghrei-Nikbakht, P.A., *See* Selkirk, J.K., 8:24451
Noid, D.W., Intramolecular dynamics in the quasiperiodic and stochastic regimes, 8:24561 (BA;US)
See Halonen, L., 8:24552
Nolte, G., Charge state determination of fast ions in solids using radiative electron capture (REC), 8:24538 (RA;DE;In German)
See Berry, S., 8:24539
See Janke, M., 8:24179
See Schneider, D., 8:24540
See Schwietz, G., 8:24178
See Stettner, U., 8:24160
See Werner, H.C., 8:24537
Nomm, E., *See* Gimmy, K.L., 8:23639
Nordstrom, D.K., *See* Davis, A.O., 8:24289
Norem, J.H., Can wall and limiter erosion be eliminated in fusion reactors?, 8:24966 (J;US)
See Pellin, M.J., 8:24812
Norman, D.A., Human cognition, 8:23562 (RA;US)
Norris, C., *See* Spencer, H., 8:24461
Noshkin, V.E., Comparative behavior of plutonium and americium in the equatorial Pacific, 8:24295 (R;US)
Noterdaeme, J.M., Icrf antenna design for a 3 MW, 3 s heating system on the TEXTOR tokamak, 8:25093 (J;US)
Notermans, G.H.J., Proposal for time-resolved ion temperature measurements by means of Rutherford scattering of the JET heating beams, 8:24773 (R;NL)
Notis, C., Learning to forecast wind at remote sites for wind-energy applications. Final report, 8:23394 (R;US)
Novotney, L.C., Potential human study populations for non-ionizing (radio frequency) radiation health effects, 8:24480 (R;US)
Nowak, E.J., Backfill barriers for nuclear waste repositories in salt, 8:23138 (RA;DE)
Nowell, D.M., Device configuration management system, 8:25178 (J;US)
Nudelman, A., Optically insulated power supply for high voltage instruments, 8:25073 (J;US)
Nuernberg, A., *See* Fang, D.Y., 8:24886
Nur, A., Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R;US)
Nusgens, P., *See* Heikhaus, H.H., 8:23322
Nyilas, A., *See* Krauth, H., 8:25055

O

O'Donnell, A., *See* Der, Z.A., 8:24494
O'Donnell, P., *See* Harris, R., 8:23493
O'Dwyer, J.J., *See* Tsang, K.L., 8:24009
O'Hare, G.A., ADVCON; advance control 93 APT postprocessor, 8:24095 (R;US)
BXAMER; hustler two-axis lathe APT postprocessor, 8:24097 (R;US)
OKUMA; OKUMA two-axis lathe APT postprocessor, 8:24098 (R;US)
PTTOPT; point-to-point tool APT postprocessor, 8:24096 (R;US)
O'Keefe, A., *See* Grieman, F.J., 8:24565
O'Neill, J.P., *See* Preston, R.J., 8:24376
O'Rourke, T.D., *See* Trautmann, C.H., 8:23437
Oakberg, E.F., Effect of ethylnitrosourea, methylnitrosourea, and hydroxyethylnitrosourea on the testis, 8:24440 (RA;US)
Obara, K., Leak detection inside a vacuum vessel, 8:25208 (J;US)
Obata, Yukio, Research program and present status of tritium technology in Japan Atomic Energy Research Institute, 8:24834 (RA;JP)
Oberjohn, W.J., Computational tools for pulverized-coal combustion. Sixth quarterly report, July 1982-September 1982, 8:22999 (R;US)
Obermeyer, R., *See* Mulay, L.N., 8:24057
Oberson, R., *See* Bonnal, J.F., 8:25088
Obert, W., Cryopumps for JET - design of a large scale system of open configuration for high specific pumping speed, 8:25203 (J;US)
Obloch, H., *See* Gloel, J., 8:23298
Ocken, H., Fission gas release from fuel rods irradiated in US commercial light water reactors, 8:23457 (RA;US)
Oedingen, R., *See* Baake, M., 8:24630
Oeschler, H., *See* Bohne, W., 8:24687
Ogard, A.E., Eh and fission product solubilities: two factors in the leaching of UO_2, 8:23109 (J;US)
Ogasawara, T., Studies on stability and a.c. losses of filamentary conductors for fast ramp rate ohmic heating coils, 8:25041 (J;US)

Ogata, A., Data processing system for JT-60, 8:25198 (J;US)
See Hosogane, N., 8:25179
See Kimura, T., 8:25180
See Suzuki, Y., 8:25177
Ogawa, K., *See* Shimada, T., 8:24948
Oglesby, M.J., *See* Morari, M., 8:23860
Ohkubo, M., Load tests of a large coil, 8:25001 (J;US)
See Miyata, H., 8:24999, 8:25000
Ohlig, P., Epidemiologic investigation of the mercury excretion in the urine of children living in an area of industrial concentration (Western Ruhr District), 8:24410 (R;DE;In German)
Ohta, M., *See* Kajiura, S., 8:25212
See Miyata, H., 8:24999, 8:25000
See Nakashima, H., 8:24974
Ohtsuka, H., *See* McCracken, G.M., 8:24869
Ohtsuka, M., *See* Shimada, M., 8:24866
Oicles, J.A., Reliable trigger unit for rail gap swtiches, 8:25076 (J;US)
See Gritton, D.G., 8:25150
See Whitham, K., 8:25143, 8:25144
Okada, S., *See* Endo, M., 8:24146
Okawa, M., *See* Leibbrandt, G., 8:24636
Okazaki, K., *See* Noda, N., 8:24883
See Sakamoto, Y., 8:24880
Oksza-Chocimowski, G.V., Basic technique and models for determining exposure rates over uranium-bearing soils. Final report, 8:23185 (R;US)
Okuno, K., *See* Tsuji, H., 8:25057
Olander, D.R., Thermodynamic assessment of in-reactor iodine SCC of zircaloy, 8:23982 (J;NL)
Oldberg, T., *See* Dau, G.J., 8:23464
Oleske, J.M., *See* Bogden, J.D., 8:24345
Oliker, I., Assessment of European district-heating technology, 8:23702 (R;US)
Olins, A.L., *See* Olins, D.E., 8:24316
Olins, D.E., Chromosome chemistry, 8:24316 (RA;US)
Olsen, D., TFTR diagnostic vacuum controller, 8:25184 (J;US)
Olsen, J.N., Transport of light ion beams in plasma channels, 8:25135 (J;US)
Olsen, K.H., *See* Cash, D.J., 8:24489
Olsen, S., *See* Zandt, G., 8:23370
Olson, B.H., *See* Hill, D.C., 8:24475
Olson, C.G., *See* Wieliczka, D., 8:23980
Olson, C.L., IFA-2 collective-ion-accelerator system, 8:24188 (R;US)
Olson, D.E., *See* Klett, D.E., 8:23252
Olson, R.E., Sheromak approach to high power density reactors, 8:24940 (J;US)
Olson, R.J., *See* Heck, W.W., 8:24403
Olson, W.H., *See* Cumming, R.B., 8:24438
See Selby, P.B., 8:24330
Onishi, Y., Long-term simulation of sediment and contaminant transport, 8:24291 (R;US)
or A. B. White, W.R.B., SLATEC1.0; mathematical subroutine library, 8:25248 (R;US)
Oren, L., *See* Keller, L., 8:24882
See Schwirzke, F., 8:24905
Orf, H., *See* Hilscher, D., 8:24684
Orren, L.H., Geothermal probabilistic cost study, 8:23376 (R;US)
Ortega, A., *See* Blackwell, B.F., 8:23382
Orth, D., Low-temperature heat supply with special consideration to a variety of new technologies, 8:23817 (R;DE;In German)
Orth, G., Investigation of the economic possibilities regarding the reduction of energy intensity for electrical household appliances. Vol. 1, 8:23797 (R;DE;In German)
Oskarsson, M.K., *See* Vande Woude, G.F., 8:24338
Ostenson, J.E., *See* Finnemore, D.K., 8:23974
Osterberg, C.L., Why not in the ocean, 8:23182 (J;XA)
Ostrowski, G.E., *See* Crawford, R.K., 8:24172
Otsuka, M., *See* Abe, M., 8:25181
Ott, W., Experience with the Wendelstein VII-neutral injectors, 8:25083 (J;US)
Overman, E.A. II, *See* McLaughlin, D.W., 8:24755
Owada, K., *See* Kajiura, S., 8:25212
See Kimishima, T., 8:25164
Owen, L.W., *See* Uckan, N.A., 8:25031
Owenby, C.S., *See* Witschi, H.R., 8:24442
Owenby, R.K., *See* Jacobson, K.B., 8:24412
Owens, D.K., *See* Cecchi, J.L., 8:24857
Owens, J.G., *See* Sega, G.A., 8:24432, 8:24433, 8:24434
Oyama, H., *See* Noda, N., 8:24883
See Sakamoto, Y., 8:24880
Ozarski, R.G., *See* Bliss, E.S., 8:25146, 8:25147
Ozoe, H., Laminar natural convection in an inclined rectangular box with the lower surface half heated and half insulated, 8:23350 (R;US)
Oztunali, O.I., Influence of leach rate and other parameters on groundwater migration, 8:23184 (R;US)

P

Paddock, R.A., Review of the effects of the Clean Water Act on cooling-system selection by the steam-electric industry, 8:23427 (R;US)
Padgett, S.C., *See* Canela, F., 8:23416
Pakula, T.J., *See* Cass, R.W., 8:23047
Pal, B.C., *See* Mitra, S., 8:24310
Paladino, J., *See* Neufeld, R.D., 8:22925
Palecki, E., Development of noise-abatement aids in underground mining operations, 8:22970 (R;DE;In German)
Pallavicini, M., *See* Folstad, L., 8:24326
Palmer, I.D., Numerical modeling of massive hydraulic fractures. First annual report, September 1980-August 1981, 8:24497 (R;US)
Palmrose, S., *See* Huang, S., 8:24924
Pan, H.K., *See* Knapp, G.S., 8:23945
Pan, Y., *See* Doss, E., 8:23768
Pan, Y.C., *See* Marchertas, A.H., 8:23641
Pan, Y.S., Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R;US)
Panitz, J.K.G., *See* Sharp, D.J., 8:23284
Pantell, R.H., Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R;US)
Papazoglou, T.P., EPRI/B and W cooperative program on PWR fuel-rod performance. Final report, 8:23498 (R;US)
Pardue, E.B.S., *See* Sarver, L.W., 8:23500
Parekh, R.D., Handbook of gasifiers and gas-treatment systems, 8:22920 (R;US)
Park, S.M., *See* Dhooge, P.M., 8:22937
Parker, F.L., Search of the Russian scientific literature for the descriptions of the medical consequences of the Kyshtym accident, 8:23188 (R;US)
Parker, G.A., VIVAS2; A-BC exact coupled channel scattering, 8:24513 (R;US)
Parker, J., *See* Bliss, E.S., 8:25146, 8:25147
Parker, M.A., *See* Langmuir, M.E., 8:23285
Parker, M.R., *See* Arko, A.J., 8:23888
Parr, A.C., Effects of resonances in molecular photoionization measured with triply differential photoelectron spectroscopy, 8:24519 (R;US)
Photoelectron spectrometer for high-resolution angular resolved studies, 8:24209 (R;US)
See Dehmer, J.L., 8:24555
Pasierb, E.L., Status of U.C. Irvine neutrino oscillation detector, 8:24586 (RA;US)
Pati, S.R., Densification, swelling, and microstructures of LWR fuels through extended burnups, 8:23485 (RA;US)
Fission gas release from PWR fuel rods under conditions of normal operation and power ramping, 8:23481 (RA;US)
Paton, C.L., *See* Witschi, H.R., 8:24442
Patterson, E.L., *See* Olson, C.L., 8:24188
Paulikas, A.P., *See* Veal, B.W., 8:24030
Pavlik, J., *See* Sowa, E.S., 8:23596
Paxton, C.A., *See* Strain, W.H., 8:24463
Paxton, J., *See* Huang, S., 8:24924
Payne, B.A., Organizational approach to estimating public resistance at proposed disposal sites for radioactive and hazardous wastes, 8:23120 (R;US)
Patterns of change in the business community of energy boomtowns, 8:23698 (R;US)
Payne, F.A., Cord wood gasification and gas combustion system, 8:23227 (J;US)
Payne, H.S., *See* Preston, R.J., 8:24376
Payne, M.G., Resonance ionization spectroscopy schemes for Ar, Kr and Xe, 8:24559 (J;NL)
Payne, R.A., *See* Fehlau, P.E., 8:23192
Peak, J.G., Lethality in repair-proficient Escherichia coli after 365nm ultraviolet light irradiation is dependent on fluence rate, 8:24393 (J;GB)
Peak, M.J., *See* Peak, J.G., 8:24393
Peak, R.D., CACECO; LMFBR containment accident analysis, 8:23511 (R;US)
Pearl, D.S., Effect of dietary lead and calcium on tissue lead accumulation and depletion in sheep, 8:24470 (J;US)
Pearl, R.H., Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22, 8:23368 (R;US)
See Zacharakis, T.G., 8:23369
Pearsall, K., *See* Crouch, F.W., 8:24047
Pearson, G.G., CAMAC analog signal conditioning module, 8:25197 (J;US)
Pechacek, R.E., *See* Murphy, D.P., 8:25153

Peck, S.D., Pool boiling helium heat transfer from two large monolithic copper stabilizers, 8:25011 (J;US)
Pedersen, D.R., *See* Farhadieh, R., 8:23597
See Gabor, J.D., 8:23599
See Sowa, E.S., 8:23596
See Stein, R.P., 8:23595
Pederson, D.R., *See* Gabor, J.D., 8:23598
Pedrotti, L.R., TMX upgrade magnet system mechanical issues, 8:24845 (R;US)
Peeler, J.T., *See* Rader, J.I., 8:24465
Pellegrino, J., Measure of the electron drag and the phonon drag in zinc crystals, 8:23985 (J;US)
Pellin, M.J., Impurity detection in the APEX tokamak by in-situ doppler shift laser fluorescence spectroscopy, 8:24812 (J;US)
See Gruen, D.M., 8:24521
Peltier, S.M., *See* Baker, G.A. Jr., 8:24756
Pelz, W., *See* Schliephake, R.W., 8:24496
Pelzer, W., *See* Arndt, P., 8:24161
See Busse, W., 8:24181
Pember, L.A., *See* Tylka, J.P., 8:23593
Pement, F.W., Intergranular attack in Inconel 600 nuclear steam generator tubes, 8:23923 (RA;US)
Pendergrass, J.H., Rates of loss of material from inertial fusion reactor surfaces exposed to pellet emissions, 8:25155 (J;US)
Pendleton, J.D., MIE scattering theory for particle sizing interferometry with the dual beam laser velocimeter, 8:23773 (R;US)
Pennell, W.E., *See* Honigsberg, C.A., 8:23520
Penningsfeld, F.P., *See* Ott, W., 8:25083
Pensec, T., *See* Sturtz, G., 8:24070
Penski, E.C., *See* Coutant, R.W., 8:24138
Pentinghaus, H., Thermal analysis, thermogravimetry and crystal chemical characterization of phases, 8:23136 (RA;DE)
Pepper, M., *See* Arko, A.J., 8:23888
Perdue, S.W., *See* Hsie, A.W., 8:24416
Pereira, D., *See* Bohn, H., 8:24202
Pereira, M.A., *See* Chrzanowski, J.H., 8:24919
See Heitzenroeder, P.J., 8:25034
Perez, J.M. Jr., Design and performance of feed-delivery systems for simulated radioactive waste slurries, 8:23160 (R;US)
Perkins, C.L., *See* Roberts, R.S., 8:24114
Perkins, E.H., Chemical effects on the immune system, 8:24448 (RA;US)
Radiation immunology, 8:24386 (RA;US)
Perlin, M., *See* Dalrymple, R.A., 8:23258
Perlman, M.L., *See* Watson, R.E., 8:24743
Perona, J.J., *See* Clinton, S.D., 8:24139
Perry, D.L., Synthesis and properties of uranyl monothiocarbamate alkoxides, an air-stable class of uranyl alkoxides, 8:24080 (J;CH)
Perry, E.D., TFTR neutral beam calorimeter fabrication and instrumentation, 8:25215 (J;US)
See Rappe, G.H., 8:25160
Perry, P., *See* Moskowitz, P.D., 8:23277
Persenky, J.J., *See* Clausen, M.J., 8:23537
Persiani, P.J., Isotope correlations for safeguards surveillance and accountancy methods, 8:23190 (R;US)
Persons, R., *See* Olsen, D., 8:25184
Peter, E., Investigations on the biological behaviour and the decorporation of ^{234}Th in the rat, 8:24370 (R;DE;In German)
Peterka, D.I., *See* Dabiri, A.E., 8:23838
Peterka, J.A., *See* Poreh, M., 8:23816
Petermann, G., *See* Bogomolni, R.A., 8:24074
Peters, N.E., *See* Galloway, J.N., 8:24285
Peters, W.A., *See* Longwell, J.P., 8:22902
Petersen, G.R., *See* Marks, S., 8:24391
Petersen, R.A., *See* Fleeter, R., 8:23046
Petersen, W.B., *See* Weber, A.H., 8:24253
Peterson, C., Scaling violations in inclusive e^+e^- annihilation spectra, 8:24625 (J;US)
Peterson, N.L., Diffusion mechanisms in transition-metal oxides, 8:23995 (R;US)
Peterson, R.E., Approximation of continuity of lenticular Mesaverde Group sandstone lenses utilizing close-well correlations, Piceance Basin, NW Colorado. SPE 11610, 8:23059 (R;US)
Peterson, R.L., Local controls and instrumentation for MFTF, 8:24921 (J;US)
Peterson, R.R., Creep deformation of first wall components following a plasma disruption, 8:24890 (J;NL)
Gas dynamics and heat transfer phenomena in liquid metal ICF reactor first surfaces, 8:25138 (J;US)
Low density cavity gas fireball dynamics in the light ion beam target development facility, 8:24920 (J;US)
See Watson, R.D., 8:24827
Petersson, L.G., *See* Skotheim, T., 8:23286
Petravic, M., Computational study of operating regimes for poloidal divertors, 8:24855 (J;NL)
See Post, D.E., 8:24868
Petree, F., *See* Giesen, B., 8:25063
See Lisser, J., 8:25062
Petrick, M., *See* Berry, G., 8:23772
Petrie, T., *See* Doss, E., 8:23768
Petrovic, J.J., *See* Milewski, J.V., 8:24005
Petry, W., *See* Sassa, K., 8:23963
Pettis, J.L., *See* Sheppard, A.R., 8:23820
Pettit, F.S., *See* Blachere, J.R., 8:24003
Pew, R., *See* Baron, S., 8:23558
Pferdehirt, W.P., Community energy audit: a discussion of process, resources, and potential problems, 8:23754 (R;US)
Pflanz, E., *See* Hoffmann, R., 8:24544
Pfouts, R.P., *See* Wehrenberg, J.P., 8:23014
Pfuff, M., *See* Knowles, T.R., 8:23954
Philippacopoulos, A.J., *See* Miller, C.A., 8:23634
Phillips, K.E., Performance and maintenance in coal conversion synfuels plants, 8:23726 (RA;US)
Phillips, P.J., Effects on processing conditions on the reliability of cross-linked polyethylene-cable insulation. Progress report, 8:24022 (R;US)
Phillips, S., *See* Gonano, L., 8:23150
Phillpott, J., Design principles for a large RFP experiment, 8:24947 (J;US)
Phipps, E.L., *See* Russell, W.L., 8:24423
Phipps, L.H., *See* Marchok, A.C., 8:24443
See Terzaghi, M., 8:24444
Piazza, T.R., *See* Notis, C., 8:23394
Picologlou, B.F., *See* Doss, E., 8:23768
Pierson, E.S., *See* Geyer, H.K., 8:23299
Pierson, J.R., Development of unique lightweight high-performance lead-acid batteries, 8:23673 (R;US)
Pietrafesa, L.J., Continental Shelf processes affecting the oceanography of the South Atlantic Bight. Progress report, June 1978-November 1981, 8:24502 (R;US)
Pillsbury, R.D. Jr., *See* Thome, R.J., 8:24990, 8:24993
Pindzola, M., *See* Payne, M.G., 8:24559
Pinkel, D., High resolution DNA content measurements of mammalian sperm, 8:24327 (J;US)
Pinkus, P., *See* Eliezer, D., 8:23912
Piolanti, G., *See* Cesari, F., 8:23515
Pioline, D., *See* Gudin, C., 8:23276
Piovan, R., *See* Fellin, L., 8:25218
Pipkins, J., *See* Fasolo, J.A., 8:25091
Pipkins, J.F., *See* Nerem, A., 8:25090
Pitrolo, A.A., *See* Mei, J.S., 8:23083
Pitt, C.J., *See* Oztunali, O.I., 8:23184
Pittman, P.F., Westinghouse final report: design and fabrication of a prototype system for photovoltaic residences in the Southwest, 8:23291 (R;US)
Plastino, A., *See* Baker, G.A. Jr., 8:24756
Plautz, M., *See* Neufeld, R.D., 8:22925
Plondke, N.J., *See* Rundo, J., 8:24362
Podolski, W.F., Advanced pressurized fluidized-bed combustion, 8:24150 (R;US)
See Henry, R.F., 8:22947
Pohlchen, R., *See* Salpietro, E., 8:25032
Pointud, M., *See* Kauffmann, Y., 8:23482
Poker, D.B., Temperature dependence of electrical resistivity of vanadium, platinum and copper, 8:23978 (J;US)
Policastro, A.J., Common problems in modeling of thermal plumes in air and water, 8:24252 (R;US)
See Carhart, R.A., 8:24401
Pollack, L., *See* Cook, J.S., 8:24352
Pollard, W., *See* Burns, R.E., 8:23536
See Guldmann, J.M., 8:23065
Pollock, D.A., *See* Hamilton, W.C., 8:25019
Pong, L., *See* Peterson, R.R., 8:25138
Pontau, A.E., Infrared thermography of a pump limiter on MACROTOR, 8:24854 (J;NL)
Ponton, J., Operation TUMBLER-SNAPPER 1952. Technical report, 8:24361 (R;US)
Poole, D.A., *See* Arko, A.J., 8:23888
Popp, D.M., *See* Popp, R.A., 8:24379
Popp, R.A., Mammalian biochemical genetics, 8:24379 (RA;US)
Poreh, M., Wind-tunnel research of flowfields within naturally ventilated rooms of simple geometry, 8:23816 (R;US)
Porter, D.L., Effects of irradiation on ceramics for fusion-reactor applications, 8:23992 (R;US)
Porter, G., *See* Harriman, A., 8:23210
Porz, F., *See* Grathwohl, G., 8:23994
Poschenrieder, J., *See* Ebersbach, K.F., 8:23848
Post, D., *See* Heifetz, D., 8:24856
See Petravic, M., 8:24855
See Prinja, A.K., 8:24853
Post, D.E., Models for poloidal divertors, 8:24868 (J;NL)
See Smith, D.L., 8:25172
Poston, J.E., Solid waste management at fossil plants, 8:22948 (R;US)
Potter, M.E., *See* Miller, D.B., 8:23438
Potters, J.H.H.M., Summary of processes relevant for the particle balance of a

cold plasma blanket contaminated with a small amount of helium, 8:24837 (R;NL)
Pottier, P., Criteria for high level waste disposal and characterization of barriers, 8:23129 (RA;DE)
Pottinger, H., *See* Kagey, B.T., 8:24458
Poukey, J.W., *See* Miller, R.B., 8:24187
See Olson, C.L., 8:24188
Powell, G.H., *See* Gantayat, A.N., 8:24085
Powell, J.A., *See* Chikalla, T.D., 8:23158
Powell, J.R., *See* Horn, F.L., 8:23213
Powers, B., *See* Taylor, D.B., 8:23815
Poyer, D., Residential fuel comparison patterns for poor, black, and elderly households: a comparative study. Vol I. Data base development, 8:23793 (R;US)
Praeg, W.F., FELIX: an experimental facility to study electromagnetic effects for first wall, blanket, and shield systems, 8:24970 (J;US)
See Turner, L.R., 8:24971
Pramudita, A., *See* Ma, E., 8:24582
Prater, T.A., Part-through and compact tension corrosion fatigue crack growth behavior of carbon steel in high temperature water, 8:23902 (RA;US)
Pratt, W.T., *See* Yang, J.W., 8:23655
Prejza, J., Electropolymerization of pyrrole in the presence of fluoborate, 8:24075 (J;US)
Prescott, C.Y., *See* Mestayer, M.D., 8:24602
Presser, G., *See* Wille, U., 8:24536
Presser, N., Optoacoustic measurements of IR multiphoton excitation of cis-3, 4-dichlorocyclobutene, 8:24547 (J;US)
Preston, D., *See* Baker, G.A. Jr., 8:24634
Preston, R.J., Induction of chromosome aberrations, sister chromatid exchanges and specific locus mutations by radiation and chemicals, and the application of the studies to population monitoring and risk estimation, 8:24376 (RA;US)
Prestwich, K.R., Multistage pulsed-power electron accelerators, 8:24185 (R;US)
Price, C.C., *See* Eppley, R.W., 8:24272
Price, L., *See* Pasierb, E.L., 8:24586
Priest, R.E., *See* Pedrotti, L.R., 8:24845
Prince, E., *See* Susman, S., 8:24058
Prinja, A.K., Physics of particle exhaust in pump limiters, 8:24853 (J;NL)
See Talmadge, S., 8:24852
Probst, F., *See* Ott, W., 8:25083
Proebstle, R.A., *See* Baumgartner, J.A., 8:23449
Prohammer, F.G., *See* Wider, H.U., 8:23592
Prosser, I.D., *See* Morari, M., 8:23860
Protic, D., *See* Machner, H., 8:24700
Pryde, E.H., *See* Schwab, A.W., 8:23239
Pryor, T., *See* Burns, R.E., 8:23536
Przysiezniak, R., *See* Harbec, G., 8:25065
Puhn, F.A., Selection and application of C18200 chrome copper for the OHTE confinement test helical coil, 8:25008 (J;US)
Purcell, J.E., Activity-Reporting System User's Manual. Version 1.2, 8:24355 (R;US)
User's manual for the Caretaker Information System. Version 1.2, 8:24354 (R;US)
Purviance, R., *See* Farhadieh, R., 8:23597
See Sowa, E.S., 8:23596
Purviance, R.T., *See* Stein, R.P., 8:23595
Pyecha, T.D., *See* Coleman, T.A., 8:23476

Q

Qadir, A., Dirac's large number hypothesis and the red shifts of distant galaxies, 8:24506 (R;XA)
Do neutron stars disprove multiplicative creation in Dirac's large number hypothesis, 8:24505 (R;XA)
Quinby, H.L., *See* Francis, A.J., 8:24284
Quinn, G.J., *See* Sanchez, H.F., 8:23616
Quinn, J.R., *See* Dau, G.J., 8:23464

R

Ralhlin, J.A., *See* Manny, E.F., 8:24390
Raab, R., *See* Drescher, B., 8:25272
Raber, A., Improving the injectability of high salinity brine for disposal or waterfloodings operations, 8:23027 (J;US)
Rabotnov, N.S., *See* Vinogradov, V.N., 8:25274
Rack, H.J., Tensile and fracture toughness behavior of AISI 4130 steel in the presence of eutectic Pb-Sn solder, 8:23917 (RA;US)
Radbill, J.R., *See* Redmann, G.H., 8:23614
Rader, J.I., Comparative toxicity to weanling and adult rats of lead acetate in water, 8:24465 (J;US)
Radmer, R., Studies of photosystem II using artificial donors. Progress report and renewal proposal. MML Proposal No. BI82-414, 8:24340 (R;US)
Radousky, H.B., Magnetic correlations in $ErRh_4B_4$, 8:24015 (BA;US)
Raffenetti, C., *See* Engert, D.E., 8:25260
Rafter, J.J., *See* Coffey, J.L., 8:24404
Rahman, A., Molecular dynamics studies of superionic conductors, 8:24031 (R;US)
Rahman, H., Gas deliverability and flow capacity of surveillance gas fields in Texas, 8:23063 (R;US)
Rahman, N.K., *See* Lami, A., 8:24754
Rahn, R.O., Environmental insults to DNA, 8:24413 (RA;US)
Rai, D., Actinide-solubility controls in performance assessment of nuclear-waste repositories, 8:23168 (R;US)
Raj, R., *See* Tsai, R.L., 8:24012
Rajan, J.B., *See* Miller, J.F., 8:23676
Rajnak, K., *See* Carnall, W.T., 8:24078
Raleigh, H.D., Gas-cooled reactor technology: a bibliography, 8:23507 (R;US)
Raleigh, M., *See* Murphy, D.P., 8:25153
Ramaswami, B., *See* Thorpe, S.J., 8:23910
Rankin, F.A., Solar-energy-system performance evaluation: Alpha Construction Co. single-family residence, Canton, Ohio, October 1978-March 1979, 8:23333 (R;US)
Ranney, M.A., *See* Clark, A.F., 8:24127
Rao, A.D., *See* Canela, F., 8:23416
Rao, K.R.P.M., *See* Mulay, L.N., 8:24057
Rao, V.U.S., *See* Mulay, L.N., 8:24057
Raphaelian, L.A., *See* Torpy, M.F., 8:23088
Rapp, H., *See* Wesner, F., 8:24943
Rappe, G.H., Fatigue testing of TFTR vacuum vessel bellows, 8:25160 (J;US)
Raptis, A.C., *See* Lin, W.H., 8:24753
Rasing, T.H.M., *See* Arko, A.J., 8:23888
Rasmussen, J., Role of cognitive models of operators in the design, operation and licensing of nuclear power plants, 8:23557 (RA;US)
Ratliff, J.R., *See* Brown, P.D., 8:23534
Rauch, W., Dissociation of ^{20}Ne in collisions with ^{40}Ca at 14.5 MeV/nucleon, 8:24660 (RA;DE;In German, English)
Monte-Carlo-simulation of particle decay following binary nuclear reactions, 8:24714 (RA;DE;In German, English)
See Buergel, M., 8:24693
See Gamp, A., 8:24695
See Homeyer, H., 8:24694
See Kovar, D.G., 8:24659
Rauch, W.A., Design and development of the torus gas injection control system for TFTR, 8:25103 (J;US)
Rauh, R.D., *See* Langmuir, M.E., 8:23285
Rauschenberger, H., *See* Gieseler, G., 8:23851
Rawl, D.E. Jr., *See* Caskey, G.R. Jr., 8:24911
Rawls, J.M., *See* Davis, L.G., 8:24945
Rawnsley, A., *See* Escombe, F.M., 8:23421
Rayes, L., *See* Lee, S., 8:23466
Raymer, G.D., *See* Russell, L.B., 8:24333
See Russell, W.L., 8:24421
See Selby, P.B., 8:24331, 8:24383, 8:24428, 8:24429
Raymond, C., *See* Helgesen, H., 8:25061
Raynor, G.S., 1982 breeding bird censuses and summary of 1977-1982 results, 8:24266 (R;US)
Rdissi, A., Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report, 8:23056 (R;US)
Rebstock, F., Chances of continued heat and power generation in public power stations in combination with district heating, 8:23747 (R;DE;In German)
Rebut, P.H., *See* Obert, W., 8:25203
Rechen, J., *See* Taylor, C., 8:24117
Recht, J., *See* Agarwal, Y.K., 8:24689
Recio, L., *See* Hsie, A.W., 8:24416
Reddan, W., Engineering and design aspects of the TFTR vacuum vessel bakeout and cooling system, 8:25214 (J;US)
Fabrication of the TFTR vacuum vessel, 8:25199 (J;US)
Reddoch, T.W., *See* Curtice, D.H., 8:23393
Redey, L., Applications of the DC-relaxation technique in Li-Al/FeS cell development, 8:23677 (R;US)
Current-pulse measurements of Li-Al/FeS cells, 8:23675 (R;US)
Electrode characterization of Li-Al/FeS cells, 8:23674 (R;US)
Redfield, J.A., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Redling, G., *See* Meyer, A.G., 8:22971

Redmann, G.H., Windfield and trajectory models for tornado-propelled objects. Final report, 8:23614 (R;US)
Reed, C.B., *See* Dunn, P.F., 8:23767
Reed, L.D., *See* Fowler, T.B., 8:23582
Reed, R.K., *See* Severyn, J.R., 8:25152
Reed, W.H., *See* Hill, T.R., 8:24717
Reeman, M.J., *See* Fritsch, W., 8:24534
Reeves, M., *See* Larson, N.M., 8:24274
Regan, J.D., DNA repair in human cells, 8:24417 (RA;US)
Genetic analysis of DNA repair in man with cell hybrids, 8:24377 (RA;US)
See Lalley, P.A., 8:24378
Rehak, P., *See* Gordon, H.A., 8:24195
Rehm, K.E., *See* Bohn, H., 8:24202
Rehn, L.E., *See* Wagner, W., 8:23943
Reid, R.L., *See* Bedinger, A.F.G., 8:23317
See Roeder, D.J., 8:23318
Reierson, J.D., Methodology for investigating subsystem interactions in a tokamak fusion reactor, 8:24936 (J;US)
Reil, K.O., In-pile measurement of the total vapor pressure over high-purity UO_2, 8:23547 (J;US)
Reines, F., *See* Pasierb, E.L., 8:24586
Reinkenhof, J., Thermodynamic model for a central receiver of a solar plant with partial shading of the heliostat field, 8:23300 (R;DE;In German)
Reiss, H., Measuring program for hot water supply in prefabricated houses using solar energy, 8:23313 (R;DE;In German)
Reiter, D., Monte Carlo simulation of the neutral gas density and temperature distribution due to the recycling processes at a poloidal, toroidal or mushroom limiter and at the divertor plate of a poloidal divertor, 8:24874 (J;NL)
See Nicolai, A., 8:24873
Reiter, F., Initial thermal outgassing properties of aluminium between 20/degree/c and 320/degree/c, 8:25161 (J;US)
Reiter, R., Balance of the tropospheric ozone and its relation to stratospheric intrusions indicated by cosmogenic radionuclides. Technical progress report, November 1, 1979-June 30, 1980, 8:24232 (R;US)
Relyea, J.F., Decision-tree approach to evaluating inactive uranium-processing sites for liner requirements, 8:23161 (R;US)
Remsen, D.B. Jr., *See* Nerem, A., 8:25090
Renger, G., *See* Witt, H.T., 8:24479
Renman, R.E., Results of an insulator materials test program for application inside the TFTR plasma chamber, 8:25158 (J;US)
Renner, D., *See* Busse, W., 8:24181
Rentzsch, S., Radiation damage in amorphous CuZr-alloys, 8:23965 (RA;DE;In German)
Repp, H., *See* Claassen, H.A., 8:24875
Resen, M., Electric vehicles: assessment of potential for North Central Region farm operations, 8:23887 (J;US)
Rettberg, R.J., Energy conservation evaluation of two variable interval time/temperature heat pump defrost control strategies, 8:23836 (J;US)
Reusch, H.P., *See* Reiss, H., 8:23313
Revis, N., Cardiovascular toxicology, 8:24447 (RA;US)
Revuelta, R., *See* Sasscer, D.S., 8:23310
Rey, G., *See* Lipa, M., 8:25094
Reynolds, A., Projected costs of electricity from nuclear and coal-fired power plants. Volume 2, 8:23741 (R;US)
Rhein, H., *See* Krieb, K.H., 8:22912
Richardson, J.H., *See* Singleton, M.F., 8:23086
Ricci, E., Gamma-ray spectrometric determination of UF_6 assay with 1 percent precision for international safeguards. Part 1: product and feed in 1S and 2S sample cylinders, 8:23191 (R;US)
Rice, R., *See* Marchok, A.C., 8:24443
Rice, T.R., *See* Bauman, D.S., 8:23419
Richards, J.B., *See* Bliss, E.S., 8:25146, 8:25147
Richardson, G.L., Effect of high solvent radiation exposures on TBP processing of spent LMFBR fuels, 8:23519 (R;US)
Richerson, D.W., *See* Lindberg, L.J., 8:24014
Richoux, M.C., *See* Lepoutre, G., 8:23275
Richter, A., *See* Bohne, W., 8:24663
Ridolpho, P.F., *See* Gordon, A.S., 8:24481
Riegel, D., Concentration and temperature dependence of the 4f spin relaxation of isolated Nd and Ce ions in simple metals, 8:23968 (RA;DE;In German, English)
See Barth, H.J., 8:23966, 8:24740
See Luszik-Bhadra, M., 8:23967
Rieks, H.H., *See* Scheer, J., 8:24048
Rienecker, F., *See* Summers, M.A., 8:25148
Rienecker, F. Jr., Nova target systems, 8:25149 (J;US)
Riepe, G., *See* Machner, H., 8:24700
Riester, L., *See* Swenson, P.A., 8:24375
See Terzaghi, M., 8:24444
Rigby, M.G., *See* Hill, D.C., 8:24475
Riggle, P., *See* Mercer, J.E., 8:23397
Riha, M.L., *See* Flesh, R.D., 8:23833
Riley, M.E., *See* Green, T.A., 8:24556
Ringe, A.C., Carbon dioxide and climate. A bibliography, 8:24233 (R;US)
Ringler, H., *See* Ott, W., 8:25083
Ringrose, C.D., *See* Pearl, R.H., 8:23368
See Zacharakis, T.G., 8:23369
Rising, K.R., *See* Tingey, G.L., 8:23170
Ritchie, J.M., *See* Greengard, P., 8:24477
Ritchie, L.T., *See* Johnson, J.D., 8:23633
Ritzka, R., *See* Duennweber, W., 8:24654
Rivera, C., *See* Sasscer, D.S., 8:23310
Rizzo, T.G., Analysis of preon models with a small number of flavors, 8:24628 (J;US)
Roach, P.R., New data on the heat capacity of liquid ^3He, 8:24570 (R;US)
Robberecht, R., Protective mechanisms and acclimation to solar ultraviolet-b radiation in oenothera stricta. Final report, 8:24372 (R;US)
Robbins, C.L., Solar Energy Research Institute's daylighting laboratory, 8:23827 (R;US)
Wind data for building ventilation in selected US cities, 8:23828 (R;US)
Roberda, W., In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 2), June 1981-November 1982, 8:23153 (R;US)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Appendices. Final report (Task 2), June 1981-November 1982, 8:23154 (R;US)
Roberts, D., *See* Huckins, R., 8:25169
Roberts, E., *See* Wilson, H.W., 8:23475
Roberts, R.S., Design and testing of the TX-4 Type A container for packaging radioactive waste, 8:24114 (R;US)
Roberts, V.D., Reduction of AM radio interference through control of radiated electric field, 8:23821 (RA;US)
Robertson, R., *See* Mathe, P., 8:25183
Robinson, W.R., Flux distortion effects in the diagnostic cores phase 1 assembly, 8:23578 (J;US)
Rochester, L.S., *See* Mestayer, M.D., 8:24602
Rodgers, P.W., Yield determination using long-wavelength black-body radiation from an underground nuclear explosion, 8:24220 (R;US)
Rodine, R.R., *See* Zubair, K.M., 8:25066
Rodwell, P., Investigations into monolithic pump packing as a means of underground roof support. Part B: field trials at South Bulli 'B' Mine and mathematical modelling, 8:22967 (R;AU)
Roeder, D.J., TRNSYS/GROCS simulation of the TECH House I ground-coupled-series solar-assisted heat-pump system, 8:23318 (R;US)
Roemer, F., *See* Sanger, P.A., 8:25049
Roeschert, G., *See* Drescher, B., 8:25272
Roesel, F., *See* Gruber, G., 8:24543
Roethemeyer, H., Concepts for the ultimate storage in geological formations, 8:23137 (RA;DE;In German)
Roettenbacher, R., *See* Doenitz, W., 8:23203
Rogers, A.G., Liquid Li-Pb-Bi, a new tritium breeder, 8:24958 (J;US)
Rogers, F.L., *See* Fischer, P.W., 8:25131
Rogers, G.C., *See* Moore, J.G., 8:23131
Rogers, J.D., *See* Singh, S.K., 8:25044
Rogers, L.B., *See* Crouch, F.W., 8:24047
Rogers, S., Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R;US)
Rogers, S.E., Coal liquefaction in SYNTHOIL reactor without added catalyst, 8:22916 (R;US)
Rognlien, T.D., *See* Cohen, B.I., 8:24789
Rohde, J., *See* von Cube, H.L., 8:23855
Rohrmann, C.A., Potential for large-scale uses for fission-product Xenon, 8:23105 (R;US)
Rolfe, R., *See* Kozlowski, T., 8:24184
Rombough, C.T., *See* Newman, L.W., 8:23473
Romero, L., *See* Caffey, T.W.H., 8:24155
Roop, B.C., *See* Fujimura, R.K., 8:24314
Rosa, W.C., *See* Sutton, D.C., 8:24473
Rose, M.J., Update of the 'development of alternate liquid fuels'. Paper 81.24.7, 8:23867 (J;US)
Rosenbaum, H.S., *See* Davies, J.H., 8:23460
Rosenblatt, D.H., *See* Tobin, J.G., 8:23981
Rosenfeld, C.L., *See* Wade, J.E., 8:23388
Rosenthal, A.S., Study of the $T = 3/2$ ΣN interaction, 8:24617 (RA;US)

Rosicky, E., *See* Davies, J.H., 8:23460
Rosinsky, R.W., *See* Feng, W.W., 8:24033
Ross, H.P., *See* Brower, D., 8:25027
Ross, R.R., *See* Eberhard, P.H., 8:24123
Rosse, J.S., *See* Chern, W.S., 8:23818
Rossi, M., *See* Firestone, M.A., 8:25101
Rossi-Alvarez, C., New vacuum systems for the 7 MEV CN accelerator of the Legnaro National Laboratory, 8:24145 (R;IT;IT)
Rossmassler, J.E., *See* Kozub, T., 8:25102
See Williams, M.D., 8:25081
Rossner, H., *See* Birkelund, J.R., 8:24686
See Hilscher, D., 8:24684
See Lettau, H., 8:24199, 8:24649
See Lipperheide, R., 8:24683
Rossner, H.H., *See* Jahnke, U., 8:24664
See Krappe, H.J., 8:24655, 8:24656
Rostagni, G., *See* Phillpott, J., 8:24947
Rostoker, N., *See* Barak, G., 8:24190
Rotella, F.J., *See* Jorgensen, J.D., 8:23684
Roth, J., Time-resolved measurements of hydrogen and deuterium fluxes in the ASDEX plasma boundary, 8:24775 (R;US)
Roth, M., *See* Bellissent, R., 8:23261
Rothacker, F., TRANSPORT; design of charged particle beams, 8:24165 (R;US)
Rothfuchs, T., *See* Gies, H., 8:23142
Rothman, E.D., *See* Chu, E.H.Y., 8:24366
Rothrock, R.S., *See* Kenney, F.T., 8:24449
Rouse, W.B., Outline of a model of human problem solving in failure situations, 8:23564 (RA;US)
Rowland, R.E., Radium dial workers, 8:24364 (R;US)
Roy, R., Appropriate technologies for basic energy needs in rural India. Working paper, 8:23759 (R;US)
Family and community biogas plants in rural India and China, 8:23222 (R;US)
Hydroxylated ceramic waste forms and the absurdity of 'leach tests', 8:23128 (RA;DE)
Roylance, D.K., *See* McElroy, P.M., 8:24018
Rubenstein, L.S., Regulatory perspective on extended burnup fuel, 8:23522 (RA;US)
Rud, N., *See* Graef, H., 8:24688
Ruddock, S.M., *See* Severyn, J.R., 8:25152
Rudolph, R.R., A method for analysis of reactivity insertion accidents in transient reactors, 8:23570 (J;US)
Ruester, D.E., *See* Morgan, G.D., 8:25210
Ruether, J.A., *See* Warzinski, R.P., 8:22992
Ruf, H., *See* Hassan, A.M., 8:24049
Ruf, M., Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23854 (R;DE;In German)
Ruhe, T., Guide to MAPPER presentation graphics, 8:25275 (R;US)
Rumble, E., *See* Lee, S., 8:23466
Rumsey, J., *See* Walker, R.S., 8:25238
Rundo, J., Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R;US)
Runts, E., *See* Kantus, R., 8:24679
Ruppel, T.C., Provisional values for the thermodynamic properties of potassium sulfide, 8:23776 (R;US)
Rusin, J.M., Review of multibarrier waste form development, 8:23135 (RA;DE)
Russell, D., SLACKLY; 1-dimensional multicavity klystron tube analysis, 8:24166 (R;US)
Russell, E.L., *See* Ashley, T., 8:24337
Russell, L.B., Analysis of the albino-locus region of the mouse: characterization of 34 deficiencies, 8:24333 (RA;US)
Characterization of x-autosome translocations, and their use as tools to investigate gene inactivation, 8:24335 (RA;US)
Investigation of the causes of genetic male sterility, 8:24336 (RA;US)
Investigation of the supermutagen ENU and other substances in the Mouse Spot Test, 8:24427 (RA;US)
Mouse Spot Test: evaluation of its performance as a prescreen, 8:24426 (RA;US)
Qualitative analysis of mouse specific-locus mutations, 8:24332 (RA;US)
Role of whole-mammal mutagenicity tests in predicting genetic risk, 8:24431 (RA;US)
Utilization of critical periods during development to study the effects of low levels of environmental agents, 8:24385 (RA;US)
See Ashley, T., 8:24337
Russell, W.L., Dose-response curve for ethylnitrosourea-induced specific-locus mutations in mouse spermatogonia, 8:24421 (RA;US)
Effect of dose fractionation on the ethylnitrosourea induction of specific-locus mutations in mouse spermatogonia and its bearing on risk estimation, 8:24422 (RA;US)
Effect of sex and cell stage on induction of mutations by ethylnitrosourea in the mouse, 8:24423 (RA;US)
Methylnitrosourea-induced specific-locus mutations in the mouse, 8:24425 (RA;US)
Nature of specific-locus mutations induced by ethylnitrosourea in mouse spermatogonia, 8:24424 (RA;US)
Specific-locus mutation frequencies in mouse stem-cell spermatogonia at very low radiation dose rates, and their use in the estimation of genetic hazards of radiation in man, 8:24382 (RA;US)
See Russell, L.B., 8:24332
Rust, K., *See* Casal, V., 8:23619
Rutherfoord, J.P., *See* Saries, R.L., 8:24153
Rutherford, P.H., *See* Guzdar, P.N., 8:24779
Rutten, F. van, *See* Lanza, F., 8:24004
Ruvalds, J., Magnetic impurities in superconductors. Progress report, August 1, 1982-June 30, 1983, 8:24745 (R;US)
Ruzauskas, E.J., *See* Andrews, M.G., 8:23474
Ryabchikov, L.N., *See* Vorobyov, V.V., 8:23553
Ryan, H., *See* Huckins, R., 8:25169
Ryan, T.L., *See* Byington, G.A., 8:25010
Rydberg, J., *See* Allard, B., 8:23146
Ryerson, D.E., *See* Hauser, G.C., 8:25278

S

Saba, G.P. II, *See* Hendrix, T.R., 8:24344
Sabado, M.M., Engineering design of TFTR and it's impact on future tokamaks, 8:24942 (J;US)
See Stern, E., 8:25022, 8:25023
Sacks, L.J., *See* Alesso, H.P., 8:23638
Sadana, D.K., *See* Byrne, P.F., 8:24042
Sadik, S., Study of premature explosions in artillery projectiles filled with Composition-B. Final report, 8:24217 (R;US)
Saha, P., *See* Slovic, G., 8:23652
Sahm, P.R., Directionally solidified eutectic superalloys for stationary gas turbines, 8:23407 (R;DE;In German)
Sahota, M.S., *See* Fowler, T.B., 8:23579
Saidl, J., Capacity of the borosilicate glass VG 98/12 for components of the high-level radioactive waste, 8:23130 (RA;DE;In German)
Saidoh, M., *See* Nakamura, K., 8:24906
See Yamada, R., 8:24907
Saito, K., Relationship between gastric cancer and blood trace metal levels, 8:24460 (J;US)
Sakamoto, Y., ECR discharge cleaning experiment in the JIPP T-II, 8:24880 (J;NL)
See Noda, N., 8:24883
Sakane, T., *See* Ninomiya, M., 8:23133
Salama, M.M., Assessment of corrosion fatigue behavior of offshore structures, 8:23904 (RA;US)
Salant, S.W., *See* Folkerts-Landau, E.M., 8:23723
Salomone, A., *See* Birattari, C., 8:24203
Salpietro, E., Status of the magnet systems and highlight of the main assembly problems, 8:25032 (J;US)
Salzano, F., *See* England, C., 8:23667
Samain, A., Plasma motion and purification in an ergodic divertor, 8:24871 (J;NL)
Samakog, P., EPR study of a radical anion in x-ray irradiated trifluoroacetamide single crystals at 3 K, 8:24077 (J;US)
Samson, L., *See* Jostes, R., 8:24476
Sanchez, H.F., Submerged demineralize system processing of TMI-2 accident waste water, 8:23616 (R;US)
Sandenaw, T.A., Martensitic transformation in uranium metal and its effect on superconductivity, 8:23983 (J;US)
Sanders, J.W., GLOVE CHANGE ANALYSIS SYSTEM; glove data base, 8:24091 (R;US)
Sandrik, J.M., Radiographic screen-film noise power spectrum: calibration and intercomparison, 8:24210 (J;US)
Sanford, T.W.L., Electron-channeling radiation: x-ray source feasibility study, 8:24729 (R;US)
Sanger, P.A., Production experience: the Nb/sub 3/Sn forced flow conductor for the Large Coil Program, 8:25049 (J;US)
Sann, H., *See* Froebrich, P., 8:24667
Sanner, W.S. Jr., Advanced characterization of combustion and conversion feedstocks, 8:22995 (R;US)
Santarius, J.F., Plasma engineering considerations for an inside-barrier tandem mirror test facility, 8:25165 (J;US)
Santini, D.J., Overview of boom towns and construction efficiency interactions, 8:23697 (R;US)

Santo, R., *See* Gaul, G., 8:24666
Saphier, D., DSNP; dynamic simulation nuclear power plants, 8:23539 (R;US)
Sarles, R.L., Converting small industrial boilers to burn wood fuels. Forest Service research paper (final), 8:24153 (R;US)
Sarohia, V., *See* Fleeter, R., 8:23046
See Wat, J., 8:23044
Sarver, L.W., Examination of Tube Samples 21-46 and 28-45 from the Ginna Nuclear Plant for intergranular attack, 8:23500 (R;US)
Sasajima, H., *See* Ohkubo, M., 8:25001
Sasaki, T., *See* Saito, K., 8:24460
Sassa, K., Moessbauer investigation of defect trapping at ^{57}Co in coldworked aluminium, 8:23963 (RA;DE;In German)
Sassoer, D.S., OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J;US)
Sastry, S., Hierarchical stability and alert state steering control of interconnected power systems, 8:23441 (J;US)
Sato, H., *See* Kajiura, S., 8:25212
Sato, T., *See* Nishimura, H., 8:25085
Sato, Y., *See* Kobayashi, S., 8:25059
Satpathy, L., *See* Gross, D.H.E., 8:24691, 8:24706
Satterfield, L.C., *See* Ullrich, R.L., 8:24388
Sattlegger, J., *See* von Cube, H.L., 8:23855
Sauers, I., *See* Hunter, S.R., 8:24523
Savage, J.W., Human-factors engineering control-room design review/audit report: Byron Generating Station, Commonwealth Edison Company, 8:23567 (R;US)
Human-factors engineering control-room design review/audit: Waterford 3 SES Generating Station, Louisiana Power and Light Company, 8:23568 (R;US)
Tables of cross references among SECY 82-111, NUREG 0700, NUREG 0835, NUREG 0801, 8:23569 (R;US)
Technical issues related to NUREG 0800, Chapter 18: Human Factors Engineering/Standard Review Plan, 8:23531 (R;US)
Savoi, P.J., *See* Brown, P.D., 8:23534
Savoia, P.J., *See* Churlik, D.G., 8:23535
Sawan, M.E., Improved materials testing module for magnetic fusion, 8:25220 (J;US)
Saxena, S.C., *See* Henry, R.F., 8:22947
Scadron, M.D., *See* McKellar, B.H.J., 8:24627
Scamans, G.M., Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA;US)
See Field, D.J., 8:23926
Schadt, W., *See* Gruber, G., 8:24543
Schaefer, W., *See* Doenitz, W., 8:23203
Schaefer, W.J., *See* Severyn, J.R., 8:25152
Schaerer, B., Air pollution by sulfur dioxide, 8:24240 (R;DE;In German)
Schaff, S., *See* Zandt, G., 8:23370
Schaff, W.J., *See* Spencer, M.G., 8:24034
Schardin, R., *See* Bader, A., 8:24177
Schardt, J.F., *See* Baumgartner, J.A., 8:23449
Scharer, J.E., *See* Beyer, J.B., 8:25098
Scharmer, K., Test stations for flat plate collectors for Iran, Brazil and India, 8:23259 (R;DE;In German)
Schatz, G., *See* Bertschat, H.H., 8:23957
Schatz, G.C., ABCD; atom-triatom nonreactive collisions, 8:24511 (R;US)
Scheele, R.D., *See* Burger, L.L., 8:23165
Scheer, J., Detection of trace elements with heavy ions, 8:24048 (RA;DE;In German)
Scheerer, H.J., *See* Bohn, H., 8:24202
Schehl, R.R., Design and modeling of low-pressure-drop methanation reactors, 8:23218 (R;US)
Transportation fuels from indirect coal liquefaction, 8:22918 (R;US)
See Diffenbach, R.A., 8:23219
See Haynes, W.P., 8:23220
Scheirle, N., *See* Rebstock, F., 8:23747
Schemenauer, K., *See* Birnbreier, H., 8:23357
Schenck, S.R., High temperature automated creep testing of ceramic fiber board, 8:24017 (RA;US)
Schenewerk, W.E., *See* Glasgow, L.E., 8:23521
Schenley, R.L., *See* Hsie, A.W., 8:24416
Scherrer, D.K., SOFTWARE TOOLS; program development interface, 8:25258 (R;US)
Scherzer, B.M.U., *See* Roth, J., 8:24775
Scheu, J., *See* Ruf, M., 8:23854
Schieder, T., *See* Kuehn, L., 8:22944
Schiewer, E., *See* Lutze, W., 8:23127
Schiffer, J.P., Resonances in s-d shell nuclei, 8:24651 (R;US)
Schiller, C.A., *See* Revis, N., 8:24447
Schilling, G., Improved plasma generator for the PLT/PDX neutral beam injectors, 8:25113 (J;US)
See Kozub, T., 8:25102
See Williams, M.D., 8:25081
Schinke, H., *See* Caemmerer, D., 8:23223, 8:23224
Schipper, L., *See* Chern, W.S., 8:23818
Schiwietz, G., *See* Berry, S., 8:24539
See Stettner, U., 8:24160
Schladitz, H., *See* Vielstich, W., 8:23784
Schlatter, D., *See* Peterson, C., 8:24625
Schlenker, R.A., Risk estimates for bone, 8:24363 (R;US)
Schliephake, R.W., Further development of automatic measuring equipment for X-ray mineral analysis with computer, 8:24496 (R;DE;In German)
Schlodder, E., *See* Witt, H.T., 8:24479
Schmauch, E.H., *See* Crouch, F.W., 8:24047
Schmidberger, R., *See* Doenitz, W., 8:23203
Schmidt, H., *See* Reiss, H., 8:23313
Schmidt, J., *See* Heifetz, D., 8:24856
Schmidt, J.A., INTOR physics, 8:25038 (J;US)
Schmidt, L., *See* Ingold, G., 8:24198
Schmidt-Boecking, H., *See* Berry, S., 8:24539
See Gruber, G., 8:24543
See Hoffmann, R., 8:24544
See Nolte, G., 8:24538
See Werner, H.C., 8:24537
Schmidt-Hansberg, Th., *See* Bogensberger, H.G., 8:25159
Schmidt-Ott, W.D., *See* Kantus, R., 8:24679
Schmitt, I., *See* Peterson, C., 8:24625
Schmitt, J.G., *See* Youngberg, A.D., 8:22923
Schmitt, R.C., *See* Lyczkowski, R.W., 8:23640
See Shah, V.L., 8:23542
Schmitz, F., Long time corrosion testing with and without mechanical stress of high temperature alloys for blades of land based gas turbines with high output, 8:23892 (R;DE;In German)
Schmoker, J.W., Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R;US)
Schnabl, F.J., 1.2 megawatt, 800 MHz rf generator for lower hybrid resonance heating, 8:25097 (J;US)
Schneider, B.I., *See* Walker, R.B., 8:24747
Schneider, D., L-shell excitation of Si and Ar in collisions of 35 to 400 keV Si^+ on Ar, 8:24540 (RA;DE;In German)
Target-thickness dependence of K-shell vacancy fractions in foil-excited ion beams, 8:24557 (J;US)
See Nolte, G., 8:24538
See Vager, Z., 8:24542
See Werner, H.C., 8:24537
Schneider, F., Plasma control techniques of the ASDEX feedback system, 8:25167 (J;US)
See Wesner, F., 8:24943
Schneider, H., Missile generation due to electrical arcing in high field fusion magnets, 8:25006 (J;US)
Schneider, R.E., *See* Whitaker, R.B., 8:24019
Schneider, U., *See* Mazur, P., 8:24397
Schnell, P., Energy conservation, 8:23709 (R;DE;In German)
Schnur, F., *See* Imhausen, K.H., 8:22914
Schoenberg, K.F., Possible steady state current drive for reversed field pinch discharges, 8:24811 (J;US)
Schoenfeld, R., *See* Bogensberger, H.G., 8:25159
Schofield, C.L., Aluminum dynamics in the ILWAS watersheds, 8:24283 (RA;US)
See Galloway, J.N., 8:24285
Scholes, R.E., *See* De Vere, A.P.C., 8:25115
Schrefler, B.A., Comparison of numerical solutions of the shell stress analysis for a large RFP experiment, 8:24949 (J;US)
Schreiber, P., *See* Scheer, J., 8:24048
Schrewe, U.J., *See* Kantus, R., 8:24679
Schrieder, G., *See* Bohne, W., 8:24663
Schroeder, W.U., *See* Wilcke, W.W., 8:24685
Schruben, J., *See* Duncan, C.S., 8:23267
Schubert, S.A., *See* Jarvis, J.B., 8:22957
Schuch, R., *See* Gruber, G., 8:24543
See Hoffmann, R., 8:24544
Schueck, C., *See* Lindenberger, K.H., 8:24678
Schuell, D., *See* von Oertzen, W., 8:24674
Schulson, E.M., Role of grain size on the brittle-to-ductile transition of the strongly ordered alloy Ni_3Al: report on progress during year-2, 8:23952 (R;US)
Schulte, S.C., *See* Fowler, T.B., 8:23384
Schultz, D.F., *See* Furman, E.R., 8:23415
Schultz, J.H., Towards strategy of reliable fusion first wall design, 8:24960 (J;US)
See Bobrov, E.S., 8:24991
Schultz, K.R., *See* Hopkins, G.R., 8:24934

See Huggenberger, M., 8:24981
See Wong, C.P.C., 8:24977, 8:24978
Schultz, T.W., Cytotoxicity of fossil fuel related pure compounds and complex mixtures, 8:24420 (RA;US)
See Dumont, J.N., 8:24419
Schulz, H., Catalysts and relations of selectivity for the Fischer-Tropsch-Syntheis, 8:22915 (R;DE;In German)
Schulz, M., Theory of the auroral magnetosphere, 8:24509 (R;US)
Schumacher, G., *See* Rentzsch, S., 8:23965
Schumacher, J., *See* Doenitz, W., 8:23203
Schumacher, P.M., *See* Henry, W.M., 8:24051
Schumacher, R.J., *See* Whitaker, R.B., 8:24019
Schwab, A.W., Microemulsions from vegetable oil and aqueous alcohol with 1-butanol surfactant as alternative fuel for diesel engines, 8:23239 (P;US)
Schwager, I., Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R;US)
Schwartz, J.L., *See* Jostes, R., 8:24476
Schwartz, S.E., Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J;US)
Schwartz, W.F., *See* Folkerts-Landau, E.M., 8:23723
Schwarzenau, R., *See* Beck, H.P., 8:23431
Schwenterly, S.W., Cryogenic voltage withstand and heat transfer tests for the General Electric large coil turn heaters, 8:25009 (J;US)
Schwietz, G., Field studies of an analyzing magnet and calculation of ion trajectories for charge exchange experiments, 8:24178 (RA;DE;In German)
Schwirzke, F., Behavior of hot titanium getters at the plasma edge in tokamaks, 8:24905 (J;NL)
See Keller, L., 8:24882
Schwob, J.L., *See* Stratton, B.C., 8:24770
Scofield, N.R., Introductory user's manual for the US Nuclear Regulatory Commission Reactor Safety Research Data Bank, 8:23628 (R;US)
Scott, B.A., *See* Meyerson, B.S., 8:24036
Scott, D.S., *See* Abbott, D., 8:22900
Scott, F.R., EPRI fusion program and its thrust in fusion engineering, 8:25157 (J;US)
Scott, H., *See* Reddan, W., 8:25199
Scott, J.T., DWG100RQ;DWG101RQ; convert to or from SI units, 8:25245 (R;US)
Scully, J.C., Environmental variables and stress corrosion crack propagation rates, 8:23908 (RA;US)
Seager, C.H., *See* Sharp, D.J., 8:23284
Seaman, L., *See* McHugh, S., 8:23611
Sedlet, J., Environmental monitoring considerations for low-level waste disposal sites, 8:23183 (R;US)
See Gureghian, A.B., 8:23119
Sega, G.A., Chemical dosimetry studies in mammalian germ cells, 8:24432 (RA;US)
DNA damage in mammalian sperm assayed by alkaline elution, 8:24434 (RA;US)
DNA repair studies in mammalian germ cells, 8:24433 (RA;US)
See Cumming, R.B., 8:24436
Sega, M.W., *See* Terzaghi, M., 8:24444
Segal, H.R., Current densities of commercial NbTi-based alloys for high field applications, 8:24118 (J;US)
Segal, P., *See* Manny, E.F., 8:24390
Segers, C., *See* Katz, M., 8:24809
Seibt, E.W., *See* Komarek, P., 8:24116
Seidenaticker, R.G., *See* Duncan, C.S., 8:23267
Selan, J.C., Technical evaluation report on the adequacy of station electric-distribution-system voltages for the Millstone Nuclear Power Station, Units 1 and 2. Docket Nos. 50-245, 50-336, 8:23467 (R;US)
Selby, P.B., Development of methods and criteria for deciding whether specific-locus mutation-rate data indicate a positive, negative, or inconclusive result, 8:24330 (RA;US)
Ethylnitrosourea is also a supermutagen for dominant skeletal mutations, 8:24428 (RA;US)
Further development of techniques for studying induction of dominant skeletal mutations, 8:24331 (RA;US)
Studies on the induction of dominant skeletal mutations by radiation, 8:24383 (RA;US)
Tests of dichlorvos to see if it induces dominant skeletal mutations, 8:24429 (RA;US)
See Russell, L.B., 8:24431
Selkirk, J.K., Carcinogen activity in human and rodent cells and tissues, 8:24451 (RA;US)
Sella, G.E., Serum copper, follicular stimulating hormone, luteinizing hormone, prolactin, spermatic count, viability, progression and seminal zinc correlations in a human (male) infertility study, 8:24472 (J;US)
Sellin, H.G., *See* Rahn, R.O., 8:24413
Sellin, I.A., *See* Berry, S., 8:24539
Sellner, K., *See* Eppley, R.W., 8:24272
Semmler, W., *See* Alber, D., 8:24676
See Berger, A., 8:24677
See Butt, R., 8:23962
See Devare, H.G., 8:23956
See Graef, H., 8:24688
See Metzner, H., 8:23964
Senjanovic, G., *See* Mohapatra, R.N., 8:24632
Seppala, L.G., *See* Bliss, E.S., 8:25146, 8:25147
See Summers, M.A., 8:25148
Sermund, G., Solid state nuclear track detectors (SSNTD), 8:24201 (RA;DE;In German)
Serne, R.J., *See* Sherwood, D.R., 8:23152
Serot, D.E., *See* Jess, M., 8:23740
Sethuraman, S.K., Study of the erosion rate of vacuum arcs in a transverse magnetic field, 8:24885 (J;NL)
Severns, J.G., Thermovoltaic power source, 8:23287 (P;US)
Severyn, J.R., Novanet, a local computer network, and Nova target data acquisition system, 8:25152 (J;US)
See Rienecker, F. Jr., 8:25149
Sewell, E.G., 2DEPEP; elliptic, parabolic & eigenvalue solutions., 8:25244 (R;US)
Sgro, A.G., Flux loss and heating during the formation of a field-reversed configuration, 8:24792 (J;US)
Sha, J.Y., *See* Rundo, J., 8:24362
Sha, W.T., *See* Lyczkowski, R.W., 8:23640
See Shah, V.L., 8:23542
See Vanka, S.P., 8:23577
Shachter, R.D., An incentive approach to eliciting probabilities. Research report, 8:24307 (R;US)
Shaffer, C.J., *See* Cook, J.S., 8:24352
Shah, V.L., Simulation of thermal-transient-induced-pipe-flow stratification using COMMIX-2, 8:23542 (R;US)
Shaked, H., *See* Westlake, D.G., 8:23997
Shampine, L.F., Efficient extrapolation methods for ODEs, 8:25277 (R;US)
Shanfield, S.R., Transient cooling in internally cooled, cabled superconductors (ICCS), 8:24124 (J;US)
Shang, J.Y., *See* Mei, J.S., 8:23083
Shanker, R., *See* Wille, U., 8:24535
Shannon, A.W., LR; LR(1) grammar analyzer & parser generator, 8:25249 (R;US)
Shannon, J.D., Intercomparison of MAP3S models of long-range transport and deposition, 8:24231 (R;US)
Sharma, R.K., Advanced intake technology for cooling-water intakes: current status and future direction, 8:23409 (R;US)
Sharma, R.P., *See* Bourcier, D.R., 8:24471
Sharp, D.H., *See* Bender, C.M., 8:24633
Sharp, D.J., Effects of ion beam hydrogenation on silicon solar cell structures, 8:23284 (J;CH)
Sharp, J.K., Investor and federal treasury returns from investing in solar-thermal energy, 8:23307 (R;US)
Sharpe, A.W., *See* Prestwich, K.R., 8:24185
Sharrer, W.L., *See* Lundberg, D.A., 8:23087, 8:23089, 8:23090, 8:23091, 8:23092, 8:23093, 8:23094, 8:23095
Shatynski, S.R., *See* Sherwood, W., 8:23925
Shearer, J.A., *See* Johnson, I., 8:24148
Shearer, J.W., *See* Yugo, J.J., 8:24776
Sheffield, J.C., *See* Dietz, L.A., 8:24510
Shelby, J.E., *See* Vitko, J. Jr., 8:23355
Shen, S., *See* Vyas, A.D., 8:23256
See Wolsky, A.M., 8:23685
Shen, S.S., Superconducting ohmic heating solenoid concept for ISX-C, 8:25014 (J;US)
See Miller, J.R., 8:25051
Shen, Y.R., *See* Tom, H.W.K., 8:24069
Shenfish, K.L., Solar-energy-system performance evaluation: Scattergood School Recreation Center, West Branch, Iowa, June 1978-April 1979, 8:23339 (R;US)
Solar-energy-system performance evaluation: Northview Elementary School (Howard's Grove) Howard's Grove, Wisconsin, September 1978-April 1979, 8:23346 (R;US)
Shepanek, R., *See* Ponton, J., 8:24361
Shephard, G.W., Status of Doublet III data archival and retrieval system, 8:25168 (J;US)
Sheppard, A.R., Biological effects of radio-frequency radiation, 8:23820 (RA;US)
Sher, R., Active neutron coincidence counting for the assay of MTR fuel elements, 8:23193 (R;US)
Sheridan, T.B., Cognitive models and computer aids for nuclear plant

control room operators, 8:23559 (RA;US)
Sherman, D.E., *See* Byerly, R.T., 8:23434
Sherman, G.R., *See* Bennett, G.A., 8:23372
Sherman, M.P., *See* Camp, A.L., 8:23654
Sherwood, D.R., Evaluation of selected neutralizing agents for the treatment of uranium tailings leachates. Laboratory progress report, 8:23152 (R;US)
Sherwood, W., Influence of interfacial stresses on oxide scale adherence, 8:23925 (RA;US)
Shettel, D.L. Jr., Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23098 (R;US)
See Hardy, L.C., 8:23099, 8:23100
Shi, S., *See* Hubbard, L.M., 8:24549
See Lindenberger, K.H., 8:24678
Shiba, M., *See* Marchok, A.C., 8:24443
Shibata, T., Release of fission products from irradiated aluminide fuel at high temperature, 8:23604 (R;US)
Shields, J., XOQDOQ; nuclear power plant effluent releases, 8:23572 (R;US)
Shields, J.A., LADTAP2; liquid pathway dose calculations, 8:24293 (R;US)
Shields, R.P., CHART; iodine decay heat on charcoal adsorbers, 8:23583 (R;US)
Shier, W.G., *See* Lu, M.S., 8:23653
Shiga, S., Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA;US)
Shikata, E., *See* Yamaguchi, K., 8:25124
Shikiar, R., *See* Clausen, M.J., 8:23537
Shiles, E., *See* Smith, D.Y., 8:24560
Shimada, M., High density, single-null poloidal divertor results in doublet III, 8:24866 (J;NL)
See Shinya, K., 8:25058
Shimada, T., TPE-1R (M) reversed field pinch experiment, 8:24948 (J;US)
Shimamoto, S., Advances in the cluster test facility and the test module coil development, 8:25056 (J;US)
Latest status of the Japanese LCT coil and the domestic test facility, 8:25053 (J;US)
See Luton, J.N. Jr., 8:25036
Shimizu, M., Design, fabrication and testing of a model heating and cooling system for a vacuum vessel, 8:24927 (J;US)
See Kajiura, S., 8:25212
See Kimishima, T., 8:25164
Shimmin, W.L., *See* Baum, D.W., 8:23763
Shimotake, H., *See* Nelson, P.A., 8:23408, 8:23885
Shintomi, T., Power supply for the poloidal coil of tokamak fusion reactor, 8:25074 (J;US)
Shinya, K., Shaping and controlling Dee-shaped tokamak plasmas, 8:25058 (J;US)
See Shimada, M., 8:24866
Shipley, W.D., *See* Byington, G.A., 8:25010
Shipsey, E.J., *See* Green, T.A., 8:24556
Shirley, D.A., *See* Tobin, J.G., 8:23981
Shively, J.F., 60-GHz-gyrotron development program. Quarterly report No. 13, July-September 1982, 8:24836 (R;US)
Recent progress in fusion gyrotron development, 8:25122 (J;US)
Shizuoka, Y., *See* Ohkubo, M., 8:25001
Shkarofsky, I.P., Transport effects with hot electrons in laser fusion. Final report, October 1, 1981-February 28, 1983, 8:24826 (R;US)
Shogan, R.P., *See* Murty, K.L., 8:23919
Shope, S.L., *See* Mazarakis, M.G., 8:24169
Shotter, A.C., *See* Bice, A.N., 8:24701
Shoucri, M.M., *See* Boucher, C., 8:24862
Shriner, D.S., *See* Heck, W.W., 8:24403
Shrock, R.O., *See* Lubin, A.H., 8:24459, 8:24468
Shugart, L.R., *See* Holland, J.M., 8:24446
Shunk, E.R., *See* Fehlau, P.E., 8:23192
Siegel, A.J., Cognitive models embedded in system simulation models, 8:23565 (RA;US)
Siegel, R.W., Atomic defects and diffusion in metals, 8:23936 (R;US)
Characterization of defects in metals by positron-annihilation spectroscopy, 8:23953 (R;US)
See Chakraborty, B., 8:23937, 8:23939
See Fluss, M.J., 8:23942
See Smedskjaer, L.C., 8:23933, 8:23941
Siegmon, G., *See* Sermund, G., 8:24201
Sielkmann, H., *See* Froebrich, P., 8:24667
Sielemann, R., *See* Alber, D., 8:24676
See Berger, A., 8:24677
See Devare, H.G., 8:23956
See Metzner, H., 8:23964
Sienicki, J.J., Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J;US)
The effects of flowing fuel particulate on bulk freezing predictions, 8:23647 (J;US)
Sigler, C.A., *See* Witschi, H.R., 8:24442
Signs, S.A., *See* Lubin, A.H., 8:24300, 8:24459, 8:24468
Sikov, M.R., Carcinogenesis following prenatal exposure to radiation, 8:24395 (J;DE)
See Kelman, B.J., 8:24394
Silbar, R.R., *See* Bowman, J.D., 8:24578
Silevitch, M.B., *See* Cipolla, J.W. Jr., 8:24805
Sill, C.W., *See* Welch, J.M., 8:23124
Sill, W.R., SPXCPL; two-dimensional modeling of self-potential effects, 8:23366 (R;US)
Silver, R.N., *See* Tonks, D.L., 8:23977
Silverman, B.H., *See* Nefkens, B.M.K., 8:24611
Silverman, D., Phenomenological analysis of reactor data for neutrino oscillations, 8:24587 (RA;US)
Silverman, J.P., *See* Chapin, T.J., 8:24196
Siman-Tov, M., *See* Shields, R.P., 8:23583
Simmons, G., Microcracks and energy. Progress report, 1 March 1982-28 February 1983, 8:23096 (R;US)
Simmons, W.W., Nova laser system for inertial confinement fusion, 8:25140 (J;US)
Simms, S., *See* Bauer, T.H., 8:23650
Simoneit, H.W., *See* Ebert, G., 8:23853
Simony, P.R., *See* McGuire, J.H., 8:24529
Simpkins, J.E., Studies of chromium gettering, 8:24903 (J;NL)
Sineath, H.H., *See* Flanigan, V.J., 8:23270
Sinfelt, J.H., *See* Meitzner, G., 8:23972
Sing, C.S., *See* Chu, E.H.Y., 8:24366
Singh, M.K., *See* Giese, R.F., 8:23729
Singh, M.S., *See* Rienecker, F. Jr., 8:25149
Singh, R.S., *See* Fowler, T.B., 8:24702
Singh, S.K., Design of a superconducting 20 MJ induction coil, 8:25044 (J;US)
Singleton, M.F., Occurrence of biomarkers in Green River shale oil, 8:23086 (R;US)
Sinha, S.K., Study of coexistence of ferromagnetism and superconductivity in single-crystal $ErRh_4B_4$, 8:23996 (R;US)
Sinha, S.N., *See* Niyogi, S.K., 8:24313
Sire, G., Conception, implementation and performance of the high power, high frequency amplifier for icrh at Fontenay-aux-Roses, France, 8:24925 (J;US)
Sisson, R.D. Jr., *See* Louthan, M.R. Jr., 8:23895
Skaggs, R.L., *See* Sneider, S.C., 8:24270
Skaperdas, G., *See* England, C., 8:23667
Skidmore, M.R., *See* Walls, A.A., 8:24191
Skinner, C.S., *See* Mighdoll, P., 8:22984
Skinner, D.M., Structure and organization of the eukaryotic genome with special emphasis on satellite DNAs, 8:24317 (RA;US)
Skorpik, J.R., *See* Hutton, P.H., 8:24142
Skotheim, T., Photoelectrochemical behavior of n-Si electrodes protected with Pt-polypyrrole, 8:23286 (J;US)
See Prejza, J., 8:24075
Skow, L.C., *See* Popp, R.A., 8:24379
Sladkovic, R., *See* Reiter, R., 8:24232
Slaga, T.J., Skin carcinogenesis: tumor initiation and promotion, 8:24452 (RA;US)
Slaski, L.J., *See* Fowler, D.K., 8:22964
Slate, S.C., *See* Kuhn, W.L., 8:23169
Slattery, J.C., Effect of the rate of adsorption at oil-water interface upon the displacement of residual oil, 8:23019 (R;US)
Slaughter, D., Fusion reactivities for several beam and target ion distributions, 8:24847 (J;US)
Slaughter, D.R., Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets, 8:24546 (R;US)
Slavin, T., *See* Ashok, S., 8:23916
Slovic, G., Analysis of the BCL transient ECC bypass test with the TRAC-PD2/MOD1 code, 8:23652 (J;US)
Smaga, J.A., *See* Battles, J.E., 8:23683
Smailos, E., HAW-containers as a barrier in final storage, 8:24108 (RA;DE;In German)
Smart, J.A., *See* Gritton, D.G., 8:25150
Smedskjaer, L.C., Positron prevacancy effects in pure annealed metals, 8:23893 (R;US)
Positron-annihilation measurements of vacancy formation in Ni and Ni(Ge), 8:23941 (R;US)
Vacancy formation in Ni and Ni(Ge), 8:23933 (R;US)
See Fluss, M.J., 8:23940
Smelser, S.C., *See* Canela, F., 8:23416
Smerd, P.G., *See* Garzarolli, F., 8:23487
Smiers, J., *See* van Wees, F.G.H., 8:23000
Smilansky, U., *See* Gross, D.H.E., 8:24708
Smith, A.C. Jr., Prototype moving-ring reactor, 8:24933 (J;US)
Smith, A.R., Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R;US)

Smith, C.F., *See* Alesso, H.P., 8:23638
Smith, D., *See* Fuchs, W., 8:22926
Smith, D.B., *See* Gitman, G.M., 8:24154
Smith, D.L., Conceptual design of the INTOR first-wall system, 8:24823 (R;US)
Conceptual design of the INTOR first wall system, 8:25173 (J;US)
Decontamination and decommissioning of TAN radioactive liquid-waste-evaporator system (PM-2A). Final report, 8:23123 (R;US)
Physical sputtering code for fusion applications, 8:25172 (J;US)
See Abdou, M.A., 8:24820
See Mazarakis, M.G., 8:24169
See Morgan, G.D., 8:24956
Smith, D.L.M., *See* Mattas, R.F., 8:25174
Smith, D.Y., Oscillator strength sums and effective electron number in optical spectroscopy of solids, 8:24560 (BA;US)
Smith, F.G. III, *See* Garrett, A.J., 8:24234
Smith, F.H., *See* Raber, A., 8:23027
Smith, G., *See* Sun, A.Y., 8:24466
Smith, G.D., *See* Hall, M.R., 8:23290
Smith, G.W., *See* Johnson, I., 8:24148
Smith, H.H., *See* Michel, D.J., 8:23922
Smith, H.T., Solar-energy-system performance evaluation. Reedy Creek Utility District office building, Lake Buena Vista, Florida, September 1978-February, 1979, 8:23343 (R;US)
Solar-energy-system performance evaluation: Irvine School (El Camino Real Elementary School) Irvine, California, October 1978-March 1979, 8:23344 (R;US)
Solar-energy-system performance evaluation: Page Jackson Elementary School, Charles Town, West Virginia, November 1978-March 1979, 8:23345 (R;US)
Smith, L.B., Solar Energy Update: a current awareness journal, 8:23246 (R;US)
Smith, L.H., *See* Witschi, H.R., 8:24442
Smith, M.F., *See* Whitley, J.B., 8:24910
Smith, M.L., Extended burnup implementation: assessment and experience, 8:23491 (RA;US)
Smith, M.R., Implementing affirmative action in conservative times, 8:25232 (R;US)
Smith, P.K., Plasma potential in a magnetic mirror with electron-cyclotron-resonance heating, 8:24761 (R;US)
Smith, R.C., *See* Bott, T.F., 8:23646
Smith, R.I., MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R;US)
Smith, R.P., *See* Turner, L.R., 8:25046
Smith, R.T., *See* Folkerts-Landau, E.M., 8:23723
Smith, T.M., *See* Hazak, G., 8:24781
Smith, V.K., Role of allocation functions in energy modeling, 8:23695 (J;NL)
Smith, W.E., *See* Kozlowski, T., 8:24184
Smolen, G.R., *See* Fowler, T.B., 8:23403
Smolik, G.R., Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R;US)
Smyth, J.R., *See* Bray, D.J., 8:22938
Snatzke, C., *See* Kuenzel, H., 8:23799
Sneider, S.C., Unsteady-flow model of Priest Rapids Dam releases at Hanford Reach, Columbia River, Washington, 8:24270 (R;US)
Snell, C.M., *See* Kwan, T.J.T., 8:24134
Snipes, R.G., *See* Coleman, T.A., 8:23476
Snook, P.G., *See* Chrzanowski, J.H., 8:24919
Snow, E.T., *See* Mitra, S., 8:24310
Snow, G.R., *See* Chapin, T.J., 8:24196
Snyder, C.E., *See* Mitra, S., 8:24310
Sobel, H.W., *See* Pasierb, E.L., 8:24586
Sobel, M., *See* Gross, D.H.E., 8:24708
Soel, M., *See* Borrass, K., 8:24997
Sofer, W.H., Mechanisms of mutagenesis: analysis through the use of alcohol dehydrogenase in Drosophila. Contract summary, May 1978-October 1980, 8:24408 (R;US)
Sommer, C.S., *See* Crouch, F.W., 8:24047
Somorjai, G.A., *See* Leygraf, Ch., 8:23211
Sonderegger, J.L., Geology and geothermal resources of the eastern Centennial Valley, 8:23363 (J;US)
Soni, A., *See* Silverman, D., 8:24587
Sonnenschein, H., *See* Bracker, G.P., 8:23217
Sonnichsen, T.W., Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R;US)
Sorensen, C.M., *See* Lester, T.W., 8:24082
Sorey, M.L., SCHAFF; heat & water transfer in porous media, 8:23362 (R;US)
Souder, P., Polarized electron source for parity experiment at Bates, 8:24176 (R;US)
Soukas, A., *See* Cortez, B., 8:24597
Soumoff, C., *See* Skinner, D.M., 8:24317
Sousselier, Y., *See* Pottier, P., 8:23129
Southworth, S.H., *See* Parr, A.C., 8:24209
Sowa, E.S., Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium, 8:23596 (R;US)
Spampinato, P.T., Considerations for replacing PF coils on FED, 8:25047 (J;US)
Spann, M.S., *See* Skinner, D.M., 8:24317
Sparks, R.K., *See* Kwok, H.S., 8:24562
Sparrow, J.T., *See* Kandarpa, V., 8:23015
Spath, C.E., Information protection and control, 8:25283 (R;US)
Spears, W.R., Optimisation of the poloidal field coil system in pulsed tokamaks, 8:24996 (J;US)
Spellmeyer, B., *See* Busse, W., 8:24181
Spence, K.L., *See* Miller, J.S., 8:23016
Spence, R.D., *See* Stinton, D.P., 8:23108
Spencer, B.W., Phenomenological studies of HCDA issues, 8:23594 (R;US)
See Sienicki, J.J., 8:23647, 8:23648
Spencer, C.M., *See* Lambright, W.H., 8:24304, 8:24305
Spencer, H., Effect of phosphorus and calcium on zinc metabolism in man, 8:24461 (J;US)
See Menczel, J., 8:24464
Spencer, J.E., *See* Kozlowski, T., 8:24184
Spencer, M.G., Electrical characterization of grain boundaries in GaAs, 8:24034 (J;US)
Spengler, J.D., Analysis of health effects resulting from population exposures to ambient particulate matter. Annual progress report, July 16, 1982-March 15, 1983, 8:24407 (R;US)
Speth, E., *See* Ott, W., 8:25083
Spetz, S.W., *See* Newman, L.W., 8:23492
Spicos, F.N., Deep-towed RUM III: a third-generation remote underwater manipulator, 8:24156 (R;US)
Spinka, H., Experimental evidence for dibaryons, 8:24589 (RA;US)
Spinos, F., *See* Stern, E., 8:25022, 8:25023
Spradlin, H.K.L., *See* Lundberg, D.A., 8:23087, 8:23089, 8:23090, 8:23091, 8:23092, 8:23093, 8:23094, 8:23095
Sredniawski, J.J., Design and test results of an in-torus zirconium/aluminum getter pump system for PDX, 8:25211 (J;US)
See Cecchi, J.L., 8:24857
See Renman, R.E., 8:25158
Srivastava, V.C., Enhanced cooling with helium channels in the TF coil casing for FED, 8:25025 (J;US)
See Ayers, J.W., 8:24918
Stacey, W.M. Jr., International tokamak reactor conceptual design overview, 8:25037 (J;US)
Stack, D.W., *See* Carlson, D.D., 8:23629
Staebler, A., Performance of the ASDEX neutral beam injector, 8:25082 (J;US)
Staehler, J., *See* Wille, U., 8:24536
Stahl, D., *See* Travelli, A., 8:23575
Stall, J., Compact latent-heat thermal storage systems utilizing phase changes within the temperature range of 320 K and 340 K. Final report, 8:23358 (R;US;GE)
Stanforth, R.R., *See* Anderson, M.A., 8:24279
Stangeby, P.C., *See* Auciello, O., 8:25163
Stankowski, L.F., *See* Hsie, A.W., 8:24416
Stanley-Miller, J., *See* Naill, R.F., 8:23716
Stansfield, B.L., *See* Boucher, C., 8:24862
Starling, K.E., *See* Kumar, K.H., 8:24072
Stawsky, A. Perretta, A.T., *See* Kaufman, A., 8:23790
Stayton, R., *See* Cohn, J., 8:23791
Steele, J.W., *See* Mayer, F.J., 8:24849
Steele, K.F., *See* Barber, L.B. II, 8:24259
Steele, M.H., *See* Russell, W.L., 8:24421
Steele, M.S., *See* Russell, L.B., 8:24332
Steelman, J.P., *See* Lippold, W.J., 8:23478
Stefanakos, E.K., *See* Klett, D.E., 8:23252
Steffgen, F.W., *See* Warzinski, R.P., 8:22992
Steffy, R.C. Jr., Energy management annual report. Fiscal year 1982, 8:23710 (R;US)
Steger, P.J., *See* Arnold, J.B., 8:23976
Stegmann, G., *See* Nock, H.P., 8:23850
Stehle, H., KWU experience and analysis of LWR fuel with respect to high burnup, 8:23450 (RA;US)
Stein, H.J., Hydrogen-implanted silicon nitride, 8:24011 (J;US)
Stein, R.P., Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory, 8:23595 (R;US)
Stein, S., *See* Mestayer, M.D., 8:24602
Steinberg, M., The flash pyrolysis and hydropyrolysis of coal, 8:22901 (RA;CA)
Steinhoff, M.F., *See* Tsukamoto, O., 8:25016
Stekly, Z.J.J., Evaluation of the use of a normal shield to reduce transient field induced losses in tokamak superconducting coils, 8:24988 (J;US)
See Segal, H.R., 8:24118
Stell, G., *See* Karkheck, J., 8:24752
Stella, A., *See* Helgesen, H., 8:25061

Stelzner, K.F., Genetic study on mutants that will provide model systems for skin carcinogenesis, 8:24334 (RA;US)
See Russell, W.L., 8:24421
Stenglein, F.J. Jr., *See* Dalbey, W.E., 8:24445
Stensland, G.J., *See* Bowersox, V.C., 8:24226
Stenzel, C., G-factor of the 12^+ isomer in ^{198}Pb, 8:24697 (RA;DE;In German)
Stephens, F.S., *See* Lindenberger, K.H., 8:24678
Stephenson, D., *See* Pinkel, D., 8:24327
Stern, E., Design characteristics of the TFTR sector module (I), 8:25022 (J;US)
Development of TFTR sector module assembly procedures (II), 8:25023 (J;US)
Stettner, U., Modification of the An 400 accelerator, 8:24160 (RA;DE;In German)
Steunenberg, R.K., Current status of the lithium/metal sulfide system, 8:23678 (R;US)
Stevens, A., mRNA processing in yeast, 8:24312 (RA;US)
Stevens, J.E., Lower hybrid heating and current drive on PLT, 8:24766 (R;US)
Stevens, P.D., *See* Goldburg, A., 8:23026
Stevenson, J.D., Selected review and evaluation of US safety research vis-a-vis foreign safety research for nuclear power plants, 8:23636 (R;US)
Stevenson, R., *See* Caramanis, M., 8:23748
Stewart, J.N., *See* Cash, D.J., 8:24489
Stewart, K.B., *See* Fowler, T.B., 8:23554
Stewart, L.D., Future needs for neutral beams in fusion, 8:25107 (J;US)
Sticker, H., *See* Chapin, T.J., 8:24196
Stiebing, K.E., *See* Gruber, G., 8:24543
Stilwell, D.E., *See* Dhooge, P.M., 8:22937
Stinton, D.P., Mixed uranium dicarbide and uranium dioxide microspheres and process of making same, 8:23107 (P;US)
Production of spherical UO/sub 2/-UC/sub 2/ for nuclear fuel applications using thermochemical principles, 8:23108 (J;US)
Stockley, R.L., *See* Klimczak, G.W., 8:24164
Stoebet, M., *See* Vahl, M., 8:24257
Stoeffler, W., *See* Bohne, W., 8:24675
Stoenescu, S., *See* Reddan, W., 8:25199, 8:25214
Stoffels, J.J., Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R;US)
Stoloff, N.S., *See* Ashok, S., 8:23916
Stolterfoht, N., Calculation of KL-vacancy sharing in asymmetric ion-atom collisions, 8:24541 (RA;DE;In German)
See Berry, S., 8:24539
See Schneider, D., 8:24540
See Werner, H.C., 8:24537
Stone, D.S., *See* Shively, J.F., 8:25122
Stone, N.H., Plasma wake of mesosonic conducting bodies. Pt. 2. An experimental parametric study of the mid-wake ion density peak, 8:24799 (J;GB)
Plasma wake of mesosonic conducting bodies. Pt. 1. An experimental parametric study of ion focusing by the plasma sheath, 8:24916 (J;GB)
Stones, P.B., Elmo Bumpy Torus-reactor first wall/blanket shield (FWBS) design, 8:24972 (J;US)
See Driemeyer, D.E., 8:25171
See Morgan, G.D., 8:25210
Stora, J.P., *See* Dehon, C., 8:23479
Storer, J.B., *See* Ullrich, R.L., 8:24388
Strack, B., *See* Froebrich, P., 8:24667, 8:24682
Straetz, F., *See* Imhausen, K.H., 8:22914
Strain, W.H., Problems associated with heavy metals in drinking water, 8:24463 (J;US)
Strakey, J.P., *See* Demski, R.J., 8:22953
See Mack, J.D., 8:22949
Strasser, A.A., *See* Franklin, D.G., 8:23490
Strasser, K., *See* Gruene, H., 8:23785
Stratton, B.C., Spectra of germanium and selenium in the 50-350 A region from the PLT tokamak plasma, 8:24770 (R;US)
Stratton, L.W., *See* Simpkins, J.E., 8:24903
Stratton, R.W., Design, fabrication, and performance of high burn-up sphere-pac fuel rods, 8:23517 (RA;US)
Stratton, T.F., *See* Carlson, R.L., 8:24915
Straunch, M.S., CAMAC-based interlock system for power supply hardware protection on MFTF, 8:25188 (J;US)
Strauss, H.R., *See* Izzo, R., 8:24768
Streed, E.R., *See* Thomas, W.C., 8:23353
Street, H.K., Characteristics and development report for the MC3573 thermal battery, 8:23682 (R;US)
Street, R.A., Structural and electronic studies of defects in amorphous silicon. Report No. 3. Technical progress report, November 1981-January 1982, 8:23280 (R;US)
Streets, D.G., Analysis of proposed legislation to control acid rain, 8:24255 (R;US)
See Baker, J.E., 8:23696
Streib, D.L., *See* Kucuk, F., 8:23052
Streif, V.F., *See* Brooks, R.L., 8:24518
Strickert, R.G., *See* Rai, D., 8:23168
Strickland, G., *See* England, C., 8:23667
Stringer, C.D., *See* Hartman, F.C., 8:24320
Stringfellow, L.A., *See* Kenney, F.T., 8:24449
Strout, R.E. II, QUIKIE: a plotting routine to produce quick and easy graphs. Reference manual, 8:25279 (R;US)
Strumpf, H.J., Ceramic heat pipes for high-temperature heat recovery, 8:23866 (J;GB)
Stubblefield, V.E., *See* Dillow, C.F., 8:25219
Stuber, C.E., Information for technology innovation. Summary paper, 8:25284 (R;US)
Transborder flow of information. Summary paper, 8:25285 (R;US)
Stuewe, B., *See* Gruene, H., 8:23785
Sturtz, G., Novel diphosphonic and triphosphonic esters and their preparation and uses, 8:24070 (TG;US)
Su, S.D., *See* Cheng, E.T., 8:24975
Suchy, K.W., Local-government energy-conservation programs and their impact on rental buildings, 8:23704 (R;US)
Suchy, P., *See* Garzarolli, F., 8:23487
Suckewer, S., *See* Stratton, B.C., 8:24770
Suenaga, M., *See* Braginski, A.I., 8:24128
Suess, R., *See* Ott, W., 8:25083
Sukekawa, M., *See* Kimishima, T., 8:25164
Sukenobu, S., Outgassing characteristics of TiC coated materials, 8:24909 (J;NL)
Sulak, L., *See* Cortez, B., 8:24597
Sullenger, D.B., *See* Bowman, R.C. Jr., 8:24010
Sullivan, R., *See* Cumali, Z.O., 8:23837
Summers, M.A., Nova frequency conversion system, 8:25148 (J;US)
See Rienecker, F. Jr., 8:25149
Sun, A.Y., Effect of dietary manganese on the respiratory activity of liver mitochondria, 8:24466 (J;US)
Suresh, S., Crack growth retardation due to micro-roughness - a mechanism for overload effects in fatigue, 8:23986 (J;US)
Surette, B.A., *See* Cox, B., 8:23920
Suski, G.J., Nova control system - goals, architecture, and central system design, 8:25151 (J;US)
Susman, S., New method for the preparation of fast-conducting, reactive-glass systems, 8:24029 (R;US)
Structure and conductivity of the NASICON analog $Na_3SC_2(PO_4)_3$, 8:24058 (R;US)
See Gruen, D.M., 8:24904
Sutherland, C.D., Computer model of chemistry and dynamics of the mesosphere, thermosphere, and ionosphere, 8:24508 (R;US)
Sutherland, S.H., *See* Eakes, R.G., 8:24113
Sutherland, W.H., AXICRP; finite element code for creep analysis, 8:23513 (R;US)
Sutton, D.C., Analytical measurements of selected metals in samples from a human metabolic study, 8:24473 (J;US)
Sutton, S.B., Effect of a two-dimensional obstacle on the dispersion of a heavier-than-air gas in an atmospheric boundary layer, 8:24243 (R;US)
Suzuki, T., *See* Furuto, Y., 8:25020
Suzuki, Y., System design of ZENKEI, the central control system for JT-60, 8:25177 (J;US)
See Hosogane, N., 8:25179
Sviatoslasky, I.N., UWTOR-M, a conceptual design study of a modular stellarator power reactor, 8:24939 (J;US)
Swain, D.W., *See* Uckan, N.A., 8:25031
Swaine, D.J., Heavy metals in the environs of a smelter, 8:24292 (J;US)
Swaminatha, K., *See* Griffith, S.K., 8:23761
Swanson, J.L., *See* Jones, T.L., 8:23167
See Rai, D., 8:23168
Swenson, D.A., *See* Hamm, R.W., 8:24168
Swenson, D.V., Analytical and experimental investigations of rock cutting using polycrystalline diamond compact drag cutters, 8:23028 (J;US)
Swenson, P.A., Respiration shutoff in Escherichia coli and Salmonella typhimurium after far-uv irradiation, 8:24375 (RA;US)
Swift, C.D., *See* Bliss, E.S., 8:25146, 8:25147
Swing, D.M., Residential dryer-exhaust energy-reclamation demonstration project. Final report, 8:23814 (R;US)
Swisher, J., *See* Frey, D., 8:23326
Syrett, B.C., Sulfide attack in steam surface condensers, 8:23896 (RA;US)

Sze, D.K., In-situ tritium recovery from Li/sub 17/Pb/sub 83/ breeding blanket, 8:25127 (J;US)
See Peterson, R.R., 8:25138
See Sawan, M.E., 8:25220
Sze, R.C., Inductively stabilized rare-gas halide minilaser for long-pulsed operation, 8:24133 (J;US)
Szozurowski, A., Modern underground mining technologies for pitching coalbed extraction. Report No. 2. Survey of geological and mining conditions of highly inclined and steep coalbeds, and technologies of working (mining systems) in European coalfields, 8:22976 (R;US)

T

Tabor, M., *See* Weiss, J., 8:25280
Tabors, R., *See* Caramanis, M., 8:23748
Tadlock, W.E., *See* Bowman, R.C. Jr., 8:24010
Taglauer, E., *See* Roth, J., 8:24775
Tahara, N., *See* Ogata, A., 8:25198
Tahira, S., *See* Ogata, A., 8:25198
Takagi, M., Waste-water treatment apparatus, 8:24147 (TG;US)
Takahashi, T., *See* Finn, P.A., 8:24959
Takahashi, Y., *See* Ando, T., 8:25018
See Tsuji, H., 8:25057
Takai, M., *See* Moriya, M., 8:24023
Takamura, S., *See* Kato, T., 8:24020, 8:24021
Takeda, S., *See* Ikeda, N., 8:24946
Takeshita, H., *See* Finn, P.A., 8:24959
Takeuchi, H., Magnetic powder for treatment of oil-polluted waste water and process for manufacturing the powder, 8:23975 (TG;US)
Takizawa, T., *See* Miyata, H., 8:24999, 8:25000
See Ohkubo, M., 8:25001
Talbert, D.M., *See* De Marsily, G., 8:23178
Talbot, J.B., *See* Fischer, P.W., 8:25131
Talmadge, S., Large area pumped limiter experiments in MACROTOR, 8:24852 (J;NL)
See Pontau, A.E., 8:24854
See Prinja, A.K., 8:24853
Talmont, X., *See* Chesne, A., 8:23463
Tamada, N., *See* Maeda, H., 8:25040
Tan, W.Y., *See* Bayne, C.K., 8:25281
Tan, Y., *See* Heit, M., 8:24288
Tanabe, J.T., *See* Cooper, W.S., 8:25084
Tanahashi, S., *See* Gomay, Y., 8:24860
See Noda, N., 8:24883
See Sakamoto, Y., 8:24880
Tanaka, N., *See* Kozlowski, T., 8:24184
Tanaka, S., Prototype ion source for JT-60 NBI, 8:25109 (J;US)
Tanaka, Y., *See* Furuto, Y., 8:25020
Tanca, M.C., *See* Darling, S.L., 8:22931
Tang, W.M., *See* Guzdar, P.N., 8:24779
Tang, Y.C., *See* Liu, Q.K.K., 8:24646
Tanifuji, T., *See* Finn, P.A., 8:24959
Tanoue, Y., *See* Kobayashi, S., 8:25059
Tarrh, J.M., *See* Dawson, A.M., 8:23779
Tarter, R., *See* Merritt, B.T., 8:25068
Tas, H., *See* Casteels, F., 8:23145
Tasoulias, G.W., Cyrogenics for TFTR neutral beam test cell, 8:25117 (J;US)
Taylor, C., Design of epoxy-free superconducting dipole magnets and performance in both helium I and pressurized helium II, 8:24117 (J;US)
See Fowler, T.B., 8:24026
Taylor, D.B., Do-it-yourself home energy-saving techniques. 1981-82 annual technical progress report, September 25, 1981-June 30, 1982, 8:23815 (R;US)
Taylor, G., *See* Arunasalam, V., 8:24771
Taylor, J.D., *See* Eberhard, P.H., 8:24123
Taylor, J.M., *See* Madsen, M.M., 8:23117
Taylor, L.E., *See* Notis, C., 8:23394
Taylor, L.M., BLOCKS: a block-motion code for geomechanics studies, 8:24493 (R;US)
Taylor, O.W., *See* Brown, P.D., 8:23534
Taylor, R.E., *See* Mestayer, M.D., 8:24602
Taylor, R.J., *See* Keller, L., 8:24882
See Pontau, A.E., 8:24854
See Schwirzke, F., 8:24905
See Talmadge, S., 8:24852
Taylor, T., Changes in limiter surface temperature profiles for small radius plasmas in Doublet III, 8:24896 (J;NL)
Tazima, T., *See* Kawamura, T., 8:24851
Teggers, H., *See* Imhausen, K.H., 8:22914
Teixeira, J., *See* Chen, S., 8:24730
Tejedor-Tejedor, M.I., *See* Anderson, M.A., 8:24279
Teng, L.C., High intensity accelerator facility, 8:24162 (RA;US)
Tennant, R.W., *See* Yang, W.K., 8:24387
Tenney, F.H., *See* Hsu, W.L., 8:24858
Tentner, A.M., Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations, 8:23605 (R;US)
See Wider, H.U., 8:23592
Tentner A.M., New aspects in the analysis of fuel dynamics during loss-of-flow transients, 8:23645 (J;US)
Teotia, A., *See* Poyer, D., 8:23793
Terreault, B., *See* Boucher, C., 8:24862
Terry, D.R., Software requirements of the central control system computer for the TEXT tokamak, 8:25186 (J;US)
See Brower, D., 8:24944
Terry, J.C., *See* Jarvis, J.B., 8:22957
Terry, J.W., *See* Walls, A.A., 8:24191
Terzaghi, M., Normal and neoplastic growth in epithelial cells, 8:24444 (RA;US)
Thamer, B.J., Effects of moisture on radon emanation including the effects on diffusion. Open file report oct 79-Nov 81, 8:23097 (R;US)
Thayer, P.S., Roofing asphalts, pitch and UVL carcinogenesis, 8:24453 (R;US)
Thebeau, L.C., *See* Gundlach, E.R., 8:23041
Theil, E., *See* Elischer, V., 8:25104
Thiessen, H.A., Speculative ten-year plan for nuclear physics at LAMPF, 8:24596 (RA;US)
See Kozlowski, T., 8:24184
Thoel, P., *See* Gloel, J., 8:23298
Thomas, C., *See* Frank, G., 8:24360
Thomas, F.A., *See* Stevenson, J.D., 8:23636
Thomas, G.J., *See* Shettel, D.L. Jr., 8:23098
Thomas, J.A., Solar-energy-system performance evaluation: Blakedale Professional Center Office Suite, Greenwood, South Carolina, October 1978-March 1979, 8:23342 (R;US)
Thomas, L.D., ABCRR;ABCRRJ; A+BC classical trajectory study, 8:24512 (R;US)
Thomas, M.T., *See* Bruemmer, S.M., 8:23898
Thomas, W.C., Determination of incident angle modifiers for flat-plate solar collectors. Final report, 8:23353 (R;US)
Thome, R.J., Eddy current load estimation for toroidal shells as a result of plasma disruptions, 8:24990 (J;US)
Pf coil current sheets for circular section tori to produce specified internal fields, 8:24993 (J;US)
See Dawson, A.M., 8:23779
Thompson, C.J., Facility for positron computed tomography, 8:24347 (P;DE;In German)
Thompson, D.L., *See* Babcock, L.M., 8:24062
Thompson, H.M., *See* Russell, L.B., 8:24332
See Russell, W.L., 8:24421
Thompson, J.I., *See* Fowler, T.B., 8:24720
Thompson, R.E., *See* Raber, A., 8:23027
Thompson, R.J., Influence of particle size on the sintering kinetics of ultrapure sodium chloride, 8:24043 (J;US)
Thompson, S.L., *See* Weigand, G.G., 8:23656
Thompson, T., *See* Costello, F., 8:24264
Thompson, V.K., *See* McCracken, G.M., 8:24887
Thomson, S.L., *See* Bronner, G., 8:25071
Thornbrough, A.D., Sandia technology, 8:23882 (R;US)
Thorndyke, P.W., Rule-based approach to cognitive modeling of real-time decision making, 8:23566 (RA;US)
Thornton, I., Role of soil ingestion in the intake of metals by livestock, 8:24474 (J;US)
Thornton, T.A., *See* Newman, L.W., 8:23473, 8:23492
Thorpe, S.J., Slow strain rate stress corrosion testing of boiler construction materials in synthetic flue gas at elevated temperatures, 8:23910 (RA;US)
Thuemmler, F., *See* Grathwohl, G., 8:23994
Thullen, P., *See* Singh, S.K., 8:25044
Tice, B., *See* Russell, D., 8:24166
Tidemand-Petersson, P., *See* Kantus, R., 8:24679
Tiemann, R., *See* Witt, H.T., 8:24479
Tilford, C.R., Sensitivity of commercial ion gage tubes, 8:25221 (J;US)
Tiller, J., Guidebook for evaluation of resource recovery systems in municipalities, 8:23878 (R;US)
Timlen, W.V., *See* Winkler, P., 8:25201, 8:25202
Timmermans, W., *See* Iseghem, P. van, 8:23141
Tindal, M.H., *See* Kenney, F.T., 8:24449
Tindall, K.R., *See* Hsie, A.W., 8:24416
Tingey, G.L., Potential for beneficial use of krypton-85, 8:23170 (R;US)
Titchmarsh, J., *See* McCracken, G.M., 8:24887
Toaz, R.D., *See* Fleeter, R., 8:23046
Tobias, M.L., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264

Tobin, J.G., Normal photoelectron diffraction of O/Cu(001): A surface-structural determination, 8:23981 (J;US)
Tofield, B.C., Advanced electrochemical energy storage devices. Final report 1 Jan 78-31 Mar 80, 8:23681 (R;US)
Toi, K., *See* Hamada, Y., 8:24994
Tokar, M., *See* Rubenstein, L.S., 8:23522
Tokarz, R.D., Liquid level sensing device, 8:23506 (P;US)
Tokuoka, S., *See* McGregor, D.H., 8:24357
Tolley, H.D., *See* Marks, S., 8:24391
Tom, H.W.K., Studies of molecular adsorbates at interfaces by optical second-harmonic generation, 8:24069 (R;US)
Tomasko, D., *See* Weigand, G.G., 8:23656
Tone, T., *See* Kasai, M., 8:24935
Tong, S., *See* Selkirk, J.K., 8:24451
Tong, S.Y., *See* Tobin, J.G., 8:23981
Tonks, D.L., Small-polaron models for the hydrogen-concentration dependence of hydrogen diffusion in Nb, 8:23977 (J;US)
Tonon, G., *See* Lipa, M., 8:25094
Tooker, J.F., *See* Nerem, A., 8:25090
Topmiller, D.A., Human-reliability data bank for nuclear power plant operations. Volume 1. A review of existing human-reliability data banks, 8:23630 (R;US)
Torikachvili, M.S., Hydrostatic pressure effects on the superconductivity of La/sub 1.2-x/Eu/sub x/MO_6S_8 pseudoternary compounds, 8:24041 (J;US)
Torpy, M.F., Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R;US)
Torteson, T.R., *See* Sasscer, D.S., 8:23310
Touche, J., *See* Breton, J., 8:25192
Toussaint, J.C., *See* Imarisio, G., 8:23212
Towner, H.H., *See* Goldston, R.J., 8:24803
Townsend, D.B., *See* Brown, P.D., 8:23534
Toyokawa, R., *See* Ogata, A., 8:25198
Trachsel, C., *See* Smith, D.L., 8:24823
Trask, D.C., *See* Notis, C., 8:23394
Trautmann, C.H., Transmission-line structure foundations for uplift-compression loading. Final report, 8:23437 (R;US)
Trautmann, W., *See* Duennweber, W., 8:24654
Travelli, A., Effect of reduced enrichment on the fuel cycle for research reactors, 8:23576 (R;US)
US RERTR program, its fuel-development activities, and application in the KUHFR, 8:23575 (R;US)
Travis, J.R., *See* Fowler, T.B., 8:24136
Trebst, A., Photosynthetic hydrogen evolution by chloroplasts and algae and on a chloroplast battery, 8:23209 (R;US)
Tree, D.R., DOE test procedure setup measurement errors: part 1, 8:23839 (J;US)
Treglio, J., *See* Fasolo, J.A., 8:25091
Tremoulet, O.L., *See* Mercer, J.E., 8:23397
Trenholme, J.B., *See* Emmett, J.L., 8:24844
See Simmons, W.W., 8:25140
Trent, D.S., *See* Onishi, Y., 8:24291
Trester, P.W., *See* Renman, R.E., 8:25158
Trettel, D.W., *See* Notis, C., 8:23394
Trexler, E.C., DOE's electron-beam-irradiation development program, 8:22954 (R;US)
Tributsch, H., *See* Bogomolni, R.A., 8:24074
Trines, D., *See* Mestayer, M.D., 8:24602
Trinkaus, H., *See* Yoo, M.H., 8:23938
Triplett, J.C., Bibliography of Upper Devonian-Shale sequence, 8:23074 (R;US)
Triplett, J.R., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Tripp, R.D., Antiproton-nucleon experiments, 8:24590 (RA;US)
Trombik, W., *See* Duennweber, W., 8:24654
Truhlar, D.G., Reaction-path interpolation models for variational transition state theory, 8:24063 (J;US)
See Blais, N.C., 8:24079, 8:24550
Trumbo, D.B., *See* Triplett, J.C., 8:23074
Trzaska, T.J., *See* Barber, J.P., 8:23661
Tsai, R.L., Theoretical estimate of solution-precipitation creep in MgO-fluxed Si/sub 3/N/sub 4/, 8:24012 (J;US)
Tsai, S.Y.H., Mathematical modelling of thermal-plume interaction at Waterford Nuclear Power Station, 8:23573 (R;US)
Tsang, K.L., High field conduction and dielectric breakdown in nominally pure and nickel-doped MgO crystals at high temperatures, 8:24009 (J;US)
Tsang, K.T., Criterion for Baldwin instability in a symmetric tandem mirror with hot-electron end plugs, 8:24774 (R;US)
Tschersich, K.G., Light impurity removal from stainless steel by atomic hydrogen, 8:24881 (J;NL)
Tseng, T., *See* Buyukozturk, O., 8:22939
Tsuchie, Y., Study of LWR fuel behavior by well characterized tests. Part II. Post-irradiation examination and its related analysis of TSURUGA fuel, 8:23455 (RA;US)
Tsuji, H., Large-current conductor development for superconducting poloidal coils, 8:25057 (J;US)
Tsukamoto, O., Acoustic emission triangulation of mechanical disturbances in superconducting magnets, 8:25016 (J;US)
See Maeda, H., 8:25040, 8:25040
Tual, D., *See* Bonnal, J.F., 8:25088
Tubbs, L.E., *See* Birkelund, J.R., 8:24686
Tucker, P.G., Trench design and construction techniques for low-level radioactive waste disposal, 8:23155 (R;US)
Tuft, D.B., Analytical and experimental evaluation of a proposed self-forging fragment munition, 8:24216 (R;US)
Tulenko, J.S., *See* Coleman, T.A., 8:23476
Turitzin, N.M., TFTR neutral beam test facility, 8:25067 (J;US)
Turner, C.B., *See* Johnson, I., 8:24148
Turner, L., *See* Smith, D.L., 8:24823, 8:25173
Turner, L.A., Safety consequences of shorted turns in a cryostable superconducting magnet, 8:23780 (J;US)
Turner, L.J., Utilization of surface mine ponds in East Tennessee by breeding amphibians. Final report, 8:24454 (R;US)
See Fowler, D.K., 8:22964
Turner, L.R., Safety implications of shorted turns in superconducting magnets for fusion, 8:25015 (J;US)
Superconducting poloidal field coil studies for INTOR, 8:25046 (J;US)
The FELIX experimental program and future upgrades, 8:24971 (J;US)
See Evans, K. Jr., 8:24817
See Kim, S.H., 8:25052
See Praeg, W.F., 8:24970
Turner, W.D., *See* Elrod, D.C., 8:24135
Turowski, R., *See* Wagner, H.J., 8:23796
Tuszewski, M.G., *See* Sgro, A.G., 8:24792
Tybout, R.A., *See* Guldmann, J.M., 8:23065
Tyler, S.A., *See* Fowler, T.B., 8:25256
Tylka, J.P., PFR/TREAT CO1 and LO1 experiments, 8:23593 (R;US)
Tyndall, R.L., Concentration, serotypic profiles, and infectivity of Legionnaires' Disease bacteria populations in cooling towers, 8:24349 (R;US)

U

Uchikawa, S., *See* Abe, M., 8:25181
Uckan, N.A., Analysis of field error criteria in an EBT reactor, 8:25031 (J;US)
Uckan, T., *See* Uckan, N.A., 8:25031
Ueda, N., *See* Kasai, M., 8:24935
Uhlemann, R., *See* Bansal, N.K., 8:23352
Uhrmacher, M., *See* Bergmeister, F.J., 8:24665
Ulbricht, A., *See* Zehlein, H., 8:25013
Ulbricth, A., *See* Krauth, H., 8:25055
Ullrich, R.L., Radiation carcinogenesis, 8:24388 (RA;US)
Ulrich, M., *See* Buechl, K., 8:25119
Ulrich, R., *See* Flynn, E.R., 8:24658
See von Oertzen, W., 8:24692
Ulrickson, M., *See* Heifetz, D., 8:24856
Umbach, E., *See* Tobin, J.G., 8:23981
Underhill, P.R., *See* Auciello, O., 8:25163
Unger, D.J., Coupled stress-concentration spinodals, 8:23930 (RA;US)
Uno, M., *See* Ando, Y., 8:24643
Unverdross, C., *See* Drescher, B., 8:25272
Uny, G., *See* Morlevat, J.P., 8:23132
Utley, B.L., *See* Jarvis, J.B., 8:22957

V

Vadasz, P., Halo-thermal simulation of the Dead Sea, 8:24503 (R;IL)
Vaernild, O., *See* Junkrans, S., 8:23452
Vager, Z., Electron capture into Rydberg states of fast ion beams following gas and foil excitation, 8:24542 (RA;DE;In German, English)
Vahl, M., Polycyclic aromatic hydrocarbons in Danish leafy crops. Part I: PAH in kale and beets relate to point sources of PAH. Part II: a survey of PAH in commercial grown

fresh and deep-frozen kale, 8:24257 (R;US)
Valentine, K.H., *See* Kopp, M.K., 8:24207
Valentini, J.J., Collision-free coherent anti-stokes Raman spectroscopy (CARS) of molecular photofragments, 8:24558 (J;NL)
van Alstyne, R.G., *See* Ballou, J.K., 8:24125
van Arkel, W.G., Determination of environment parameters for SELPE, a model for energy supply, 8:22959 (R;NL;In Dutch)
Van Arsdall, P.J., *See* Severyn, J.R., 8:25152
van der Leeden, G.A., *See* Young, R.T., 8:23288
van der Sluys, W.A., Investigation of fatigue crack growth in a 288°C PWR water environment by a constant ΔK test method, 8:23906 (RA;US)
van der Werf, S.Y., *See* Christensen, P.R., 8:24690
van Deursen, A.P.J., *See* Arko, A.J., 8:23888
Van Dilla, M.A., *See* Pinkel, D., 8:24327
van Dorp, F., *See* De Marsily, G., 8:23178
van Heek, K.H., *See* Wanzl, K., 8:22904
van Heyden, L., Energy conservation by gas-fulled heat pumps for hot water space heating systems, 8:23803 (R;DE;In German)
van Kleef, R.P.A.R., *See* Arko, A.J., 8:23888
van Mark, E., *See* Wedler, H., 8:25064
van Rij, W.I., *See* Beasley, C.O. Jr., 8:24780
Van Sciver, S.W., Stability of an aluminum-NbTi composite conductor at reduced temperatures, 8:24129 (J;US)
See Sviatoslasky, I.N., 8:24939
Van Treeck, R., Raft river geothermal pump disassembly and inspection, 8:23381 (R;US)
Van Tuyl, H.H., Technology for recovery of byproducts, 8:23173 (R;US)
van Wees, F.G.H., Industrial fuel applications. Furnaces and dryers, 8:23000 (R;NL;In Dutch)
Vande Woude, G.F., LTR-vectors, 8:24338 (P;US)
Vandenborre, H., Development and parametric testing of alkaline water electrolysis cells for hydrogen production based on inorganic-membrane-electroylet technology. Final report, 8:23206 (R;US)
Vaniman, D., *See* Broxton, D., 8:24485
Vanka, S.P., Steady-state simulation of the FFTF in-vessel thermal hydraulics, 8:23577 (J;US)
VanSwam, L.F., *See* Exarhos, C.A., 8:23477
Varaiya, P., *See* Sastry, S., 8:23441
Varga, H.J., *See* Nerem, A., 8:25090
Varga, P., *See* Roth, J., 8:24775
Varghese, P., *See* Kozlowski, T., 8:24184
Varma, R., *See* Jorgensen, J.D., 8:23684
Varnes, A.W., *See* Strain, W.H., 8:24463
Vashishta, P., *See* Kalia, R.K., 8:24520
See Rahman, A., 8:24031
Vasudevan, C., Analysis of throughfall data and comparison of throughfall sampling procedures, 8:24236 (RA;US)
Vaurio, J.K., PROSA2; probabilistic response surface studies, 8:23580 (R;US)
Structures for common-cause failure analysis, 8:23586 (R;US)
Veal, B.W., XPS study of CaO in sodium silicate glass, 8:24030 (R;US)
Vecsey, G., *See* Marinucci, C., 8:25054
Ven, H.W. van der, *See* Notermans, G.H.J., 8:24773
Vennett, R.M., *See* Salama, M.M., 8:23904
Verderber, R., *See* Arthur, A., 8:23824
Verderber, R.R., Lighting-electromagnetic compatibility conference: proceedings, 8:23819 (R;US)
Verdonschot, J.K.M., Development of a thermal storage system based on the heat of absorption in hygroscopic materials. Final report, 8:23359 (R;US)
Verhoeven, J.D., *See* Eucker, S.S., 8:23973
See Finnemore, D.K., 8:23974
Vernet, J.E., *See* Streets, D.G., 8:24255
Vernickel, H., Test of a toroidal large area limiter in the ASDEX tokamak, 8:24859 (J;NL)
Thermal processes in tokamaks of the next generation and future reactors, 8:24889 (J;NL)
See Mast, F., 8:24895
Veselka, T., Approach to modelling vegetation yield reduction from point-source emissions of sulfur dioxide, 8:24400 (R;US)
Vesely, W.E., FRANTIC-NRC; time-dependent system unavailability, 8:25236 (R;US)
Vesterlund, G., *See* Junkrans, S., 8:23452
Vetter, H., *See* Zumkley, H., 8:24462
Via, G.H., *See* Meitzner, G., 8:23972
Vicini, F.A., Increasing total and biologically active chromium in wheat grain and spinach by spraying with chromium salts, 8:24467 (J;US)
Videbaek, F., *See* Christensen, P.R., 8:24690
Vielstich, W., Electrodes and diaphragms for fuel cells, 8:23784 (R;DE;In German)
Vignesoult, N., *See* Atabek, R., 8:23484
See Kauffmann, Y., 8:23482
Vinke, A., *See* Imhausen, K.H., 8:22914
Vinogradov, V.N., Analytically solvable examples of account for instrumental resolution with the Pade approximation of resonance curves, 8:25274 (RA;SU;In Russian)
Viskanta, R., *See* Gruszczynski, M.J., 8:23635
Vissers, D.R., *See* Redey, L., 8:23674, 8:23675, 8:23677
Vitali, J.C.A., *See* Boucher, C., 8:24862
Vitko, J. Jr., Effect of fining agents on the solarization of a borosilicate glass, 8:23355 (J;US)
See Hansen, F.R., 8:23253
Vivian, W.E., *See* Garvey, D.B., 8:23700
Vogel, H.F., *See* Bronner, G., 8:25071
Vogl, G., *See* Rentzsch, S., 8:23965
See Sassa, K., 8:23963
Volin, K.J., *See* Susman, S., 8:24029
Volkin, E., Nucleic acid biochemistry of cells, 8:24315 (RA;US)
Vollemans, P.J., *See* Cass, R.W., 8:23047
Vollmer, O., *See* Staebler, A., 8:25082
von Cube, H.L., Development of an optimizing method for the design of pipe systems in the ground used as heat source for heat pumps, 8:23855 (R;DE;In German)
von Halle, A., *See* Kozub, T., 8:25102
von Oertzen, H., *See* Bohlen, H.G., 8:24657
von Oertzen, W., Neutron pair transfer between tin isotopes, 8:24674 (RA;DE;In German)
Spin orbit interaction of ^{12}C and ^{11}B, 8:24692 (RA;DE;In German)
See Bohlen, H.G., 8:24647, 8:24648
See Flynn, E.R., 8:24658
See Froebrich, P., 8:24667
See Lettau, H., 8:24199, 8:24649
von Seggern, J., *See* Tschersich, K.G., 8:24881
von Thuna, P.C., *See* Thayer, P.S., 8:24453
Vondy, D.R., PREMOR; two-group point reactor power plant model, 8:23540 (R;US)
VonHalle, A., *See* Williams, M.D., 8:25081
VonNieda, G.E., *See* Wright, J.M., 8:24055
VonZuckerstein, I., *See* Suchy, K.W., 8:23704
Vorobyev, Y.I., Effect of radioprotective agents on reactivity to space flight factors, 8:24343 (R;US)
Vorobyov, V.V., Diffusion of hydrogen in yttrium, 8:23553 (TJ;US)
Voss, P., *See* Fahrner, W.R., 8:24208
Vresk, J., Direct solar steam-generating system, 8:23316 (R;US)
Vugmann, G., *See* Lietti, A., 8:24926
Vyas, A.D., Analysis of short-rotation forests using the Argonne model for selecting economic strategy (MOSES), 8:23256 (R;US)
See Kaplan, M.P., 8:23843

W

Wada, N., Raman measurements of folded interlayer shearing phonons in KC_{12}/sub n/ (n = 2 approx. 6), 8:24032 (R;US)
Waddell, R.K., Two-dimensional, steady-state model of ground-water flow, Nevada Test Site and vicinity, Nevada-California, 8:24484 (R;US)
Wade, J.E., Remote sensing for wind power potential: a prospector's handbook, 8:23388 (R;US)
Waganer, L., *See* Barry, K., 8:24930
Wagener, K., Energy from marine biomass: methane production by mariculture on land. Final report, 8:23272 (R;US)
Wagner, C.N.J., *See* Keller, L., 8:24882
Wagner, D.K., *See* Spencer, M.G., 8:24034
Wagner, H.J., Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses, 8:23796 (R;DE;In German)
Wagner, R., *See* Der, Z.A., 8:24494
Wagner, R.F., *See* Sandrik, J.M., 8:24210
Wagner, W., Surface segregation in concentrated Ni-Cu alloys under irradiation, 8:23943 (R;US)
Wahlquist, F.P., *See* Exarhos, C.A., 8:23477
Waibel, R.T., *See* Abbasi, H.A., 8:24152
Wakabayashi, T., *See* McGregor, D.H., 8:24357
Waksman, D., *See* Thomas, W.C., 8:23353

Waldman, L.A., *See* Fowler, T.B., 8:23187, 8:23384, 8:23403, 8:23468, 8:23554, 8:23579, 8:23581, 8:23582, 8:23993, 8:24026, 8:24089, 8:24093, 8:24136, 8:24277, 8:24702, 8:24720, 8:25250, 8:25256, 8:25264
Walker, C.A., Too hot to handle. Social and policy issues in the management of radioactive wastes, 8:23177 (B;US)
Walker, D.L., *See* Hackley, D.S., 8:25045
Walker, M.S., *See* Singh, S.K., 8:25044
Walker, R.B., L2RMAT; coupled channel inelastic scattering, 8:24747 (R;US)
Walker, R.S., PRPLOT; line printer plot subroutine package, 8:25238 (R;US)
Walker, R.V., Solar-energy-system-performance evaluation: Perl-Mack Enterprises, Inc., single-family residence, Denver, Colorado, April 1978-March 1979, 8:23332 (R;US)
Solar-energy-system performance evaluation: Rademaker Corporation office and warehouse building, Louisville, Kentucky, October 1978-March 1979, 8:23340 (R;US)
Wallace, O.J., SPAR1; shielding with analytic ray-tracing, 8:24719 (R;US)
Wallace, S., *See* Dehmer, J.L., 8:24555
Wallerstein, E.P., Optical components for the Nova laser, 8:25142 (J;US)
Walls, A.A., Remote target removal for the Oak Ridge 86-in. cyclotron, 8:24191 (J;US)
Walter, E., Behavior of tetravalent plutonium with various ion exchangers in solutions containing nitric acid and oxalates, 8:24053 (TG;US)
Walters, D., LSA large area silicon sheet task enhanced I.D. slicing. Quarterly report No. 7, July-September 1980, 8:23266 (R;US)
Walters, E.A., Effect of underground coal gasification on groundwater. Final report, 8:22960 (R;IT)
Walthers, C.R., *See* Bartlit, J.R., 8:25130
Walton, L.A., Development of an extended burnup fuel assembly, 8:23488 (RA;US)
Walz, M.J., Depleted uranium test range fragment reclamation. Final report Nov 81-Jun 82, 8:23104 (R;US)
Wambsganss, M.W., *See* Halle, H., 8:23846
Wampler, W.R., *See* Brice, D.K., 8:24797
See Roth, J., 8:24775
Wana, C.Y., ALICE-11: an arbitary lagrangian-eulerian code for containment analysis with complex internals, 8:23642 (J;US)
Wang, D.P., Physical engineering and environmental aspects of ocean kelp farming. Final report, January 1982-September 1982, 8:23257 (R;US)
Wang, J.C.F., Real-time total-mass analysis of particulates in the stack of an industrial power plant, 8:24242 (R;US)
Wang, R., Thermal stability data of amorphous binary alloys, 8:23988 (J;US)
Wang, R.C., *See* Miscoe, A.J., 8:24107
Wang, S.T., Fabrication experiences of the Coal-Fired Flow Facility superconducting dipole magnet, 8:23777 (J;US)
Measurements of mechanical properties of superstructures materials for the CFFF superconducting MHD magnet, 8:23778 (J;US)
Safety studies of cryostable superconductor, 8:24120 (J;US)
Wang, Z., Segregation in irradiated titanium alloys, 8:23931 (R;US)
Wangler, T.P., *See* Hamm, R.W., 8:24168
Wanzl, K., Results of the IEA pyrolysis project at Bergbau-Forschung, 8:22904 (RA;CA)
Ward, M.E., Ceramic-heat-exchanger technology. Final report, 8:23418 (R;US)
Ward, T.J., *See* Swaine, D.J., 8:24292
Warnatz, J., *See* Kee, R.J., 8:24137
Warnecke, E., Requirements for the disposal of high-level radioactive wastes, 8:23139 (RA;DE)
Warnecke, H., *See* Wolff, U., 8:23480
Warner, C.L., *See* Neuls, A.S., 8:23147
Warner, T.H., High-power I-V curve tracer employing a capacitive load, 8:23265 (R;US)
Warren, J.G., *See* Reddan, W., 8:25199
Warren, L.J., *See* Swaine, D.J., 8:24292
Warren, R., *See* Taylor, C., 8:24117
Warzinski, R.P., Survey of coals treated by oxydesulfurization, 8:22992 (R;US)
Wasilenko, W., *See* Marchok, A.C., 8:24443
Wat, J., Frictional characteristics and heat transfer of antimisting fuels in tubes. Final report Aug 80-Sep 81, 8:23044 (R;US)
Watanabe, H., *See* Finn, P.A., 8:24959
Watchmaker, G., *See* Pinkel, D., 8:24327
Watson, E.E., *See* Coffey, J.L., 8:24404
Watson, J.D., *See* Baum, D.W., 8:23763
Watson, J.M., Development of the rf linear accelerator test bed for heavy-ion fusion, 8:24822 (R;US)
Development of the rf linear accelerator test bed for heavy ion fusion, 8:25139 (J;US)
Watson, J.S., *See* Fischer, P.W., 8:25131
Watson, R.D., Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall, 8:24827 (R;US)
See Whitley, J.B., 8:24910
Watson, R.E., Charge transfer and the effective Coulomb interaction at metal surfaces, 8:24743 (J;US)
Watts, R.L., *See* Moore, E.B. Jr., 8:23717
Weaver, H.J., Analysis of ambient vibrational motion of MFTF-A vessel/magnet structure, 8:24839 (R;US)
Weaver, J.H., *See* Wieliczka, D., 8:23980
Weaver, T.A., *See* Woosley, S.E., 8:24507
Weaver, T.L., EBT-P plasma heating system instrumentation and control design, 8:25078 (J;US)
Webb, G.A.M., *See* De Marsily, G., 8:23178
Webb, G.L., Effect of retrogression and reaging treatment on the stress corrosion cracking susceptibility 7075-T6 aluminum alloy, 8:23911 (RA;US)
Webb, R.L., Friction factor correlation for the offset strip-fin matrix, 8:24104 (R;US)
Heat-exchanger needs for recovering waste heat in the glass-making industry. Final report, 8:23861 (R;US)
Prediction of the friction factor for the offset strip-fin matrix, 8:24105 (R;US)
Weber, A.H., Spectral scales in the atmospheric boundary layer, 8:24253 (J;US)
Statistical performance of several mesoscale atmospheric dispersion models, 8:24250 (J;US)
Weber, D.P., *See* Wider, H.U., 8:23592
Weber, J.H., *See* Weber, A.H., 8:24250
Weber, J.K., *See* Haynes, W.P., 8:23220
Webster, W.H., *See* Nelson, P.A., 8:23408, 8:23885
Wedler, H., 4000 shots with the ASDEX ohmic heating breaker, 8:25064 (J;US)
Wegley, H.L., *See* Notis, C., 8:23394
Wegner, M., *See* Ebersbach, K.F., 8:23848
Wehrenberg, J.P., Report to the Fort Belknap Community Council on the work undertaken during the summer, 1979, 8:23014 (R;US)
Wehrle, R.B., *See* Praeg, W.F., 8:24970
See Turner, L.R., 8:24971
Wehrse, R., *See* Scheer, J., 8:24048
Wei, C.H., *See* Einstein, J.R., 8:24318
Wei, P., *See* Brown, P.D., 8:23534
See Churlik, D.G., 8:23535
Wei, R.P., Fatigue crack growth in aqueous and gaseous environments, 8:23903 (RA;US)
Weichselgartner, H., New process to remove tritium from glove box atmospheres, 8:25125 (J;US)
Weigand, G.G., Two-phase jet load models, 8:23656 (J;US)
Weigand, W., *See* Braunsberger, U., 8:25029
Weiner, B., *See* Bogden, J.D., 8:24345
Weiner, D., *See* Vadasz, P., 8:24503
Weinlein, C.E., *See* Pierson, J.R., 8:23673
Weir, S.B., Rate guide for residential No. 2 heating oil and coal for SOLCOST Data Bank cities, 8:23001 (R;US)
Weiss, J., Painleve property for partial differential equations, 8:25280 (J;US)
Weitz, R., *See* Frank, G., 8:24360
See Goetz, J., 8:24359
Welch, J.M., Leach tests of simulated low-level transuranic waste forms containing transuranic elements, 8:23124 (R;US)
Weller, W., *See* Flynn, E.R., 8:24658
Wendelken, J.F., Chemisorption of oxygen on Cu(110) studied by eels and leed, 8:24744 (J;NL)
Weng, W., *See* Cortez, B., 8:24597
Werner, H.C., Charge distributions of recoil ions, 8:24537 (RA;DE;In German)
See Stettner, U., 8:24160
Wesenberg, D.L., *See* Swenson, D.V., 8:23028
Wesner, F., Operational experience with the ASDEX divertor tokamak, 8:24943 (J;US)
Wessels, F., *See* Zumkley, H., 8:24462
West, B.W., Radiative charge transfer in collisions of He^{2+} ions and ground-state H atoms, 8:24553 (J;US)
West, L.T., *See* Gitman, G.M., 8:24154
Wester, M.J., *See* Camp, A.L., 8:23654
Westlake, D.G., Interstitial site occupation in ZrNiH, 8:23997 (R;US)
Weston, M.W., Solar-energy-system performance evaluation: Hullco Construction Company single-family residence, Prescott, Arizona, May 1978-April 1979, 8:23334 (R;US)

Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979, 8:23337 (R;US)
Westaik, J.H. Jr., High-temperature leaching of an actinide-bearing, simulated high-level waste glass, 8:23159 (R;US)
Weyl, D., 20 kW fuel cell units of compact assembly. Pt. 3, 8:23786 (R;DE;In German)
Weymuth, P., *See* Marinucci, C., 8:25054
Weynants, R.R., *See* Noterdaeme, J.M., 8:25093
Whatham, J.F., BENDPAC; stress analysis of flanged pipe bends, 8:24099 (R;US)
Wheeler, D., *See* Lee, S., 8:23466
Wheeler, K.R., *See* Zaloudek, F.R., 8:23666
Wheelwright, E.J., Byproduct inventories, 8:23171 (R;US)
Whitaker, R.B., Diallyl phthalate prepolymer characterization and testing in fiberglass filled molding compounds, 8:24019 (R;US)
White, M.A., *See* Mercer, J.E., 8:23397
White, S.N., *See* Chapin, T.J., 8:24196
White, T.L., *See* Loring, C.M., 8:25121
White, W.H., *See* Schwartz, S.E., 8:24247
Whitham, K., Nova power systems and energy storage - 1, 8:25143 (J;US)
Nova power systems and energy storage - 2, 8:25144 (J;US)
Whitley, J.B., Thermal fatigue of a TiB_2 coated, long pulse, high heat flux component, 8:24910 (J;NL)
Whittle, D.P., *See* Misra, A.K., 8:24066
Wider, H.U., Status and validation of the SAS4A accident-analysis code system, 8:23592 (R;US)
See Tentner, A.M., 8:23605, 8:23645
Widlund, O., DPOLE; helmholtz equation on general 3-dimensional region, 8:25246 (R;US)
Wiedenbeck, M.G., *See* Christensen, D.H., 8:24492
Wiedersich, H., *See* Lam, N.Q., 8:23932
See Wagner, W., 8:23943
See Wang, Z., 8:23931
Wiegand, D.A., *See* Fuchs, W., 8:24076
Wieliczka, D., Photoemission studies of the γ-α phase transition in Ce: Changes in 4f character, 8:23980 (J;US)
Wieskamp, T., *See* Chargin, A.K., 8:24941
Wigger, P., *See* Giese, P., 8:23374
Wignall, G.D., Small-angle neutron scattering studies of a compatible polymer blend, atactic polystyrene-poly(2,6 dimethyl phenylene oxide), 8:24073 (J;GB)
See Koehler, W.C., 8:24732
Wilcke, W.W., Emission of light charged particles in the reaction $^{165}Ho + {}^{56}Fe$, 8:24685 (RA;DE;In German, English)
Wildanger, W., *See* Gonano, L., 8:23150
Wildi, P., Installation and operation of the motor-generator for the TEXT, 8:25028 (J;US)
See Brower, D., 8:24944, 8:25027
Wilenitz, I., *See* Moskowitz, P.D., 8:23277
Wilkerson, J.L., *See* Suski, G.J., 8:25151
Wilkerson, L.C., *See* Kozlowski, T., 8:24184
Wilkey, M., Landfill gas recovery in the USA, 8:23873 (R;US)
Wilkins, M.L., HEMP; hydrodynamic elasticmagneto plastic flow, 8:24567 (R;US)
Wilkinson, G., Foreign technology alert bibliography: batteries and components. Final report Jun 80-May 82, 8:23680 (R;US)
Wille, P., *See* Frisius, F., 8:23990
Wille, U., Analytic form factors for Coulomb ionization, 8:24533 (RA;DE;In German)
Impact-parameter dependence of M-shell excitation in slow Xe + Xe collisions, 8:24535 (RA;DE;In German)
Rotationally induced L-shell excitation in energetic Ag + Ag and Ag + Cs collisions, 8:24536 (RA;DE;In German)
See Fritsch, W., 8:24534
See Schneider, D., 8:24540
Willenberg, H.J., Engineering needs of a TRACT fusion reactor program, 8:24952 (J;US)
Low tritium inventory, phase change blanket concept for magnetic fusion, 8:24973 (J;US)
See Wong, C.P.C., 8:24977
Willett, J.E., Kinetic analysis of electromagnetic wave backscattering in a magnetized plasma, 8:24808 (J;GB)
Williams, J.D., *See* Rienecker, F. Jr., 8:25149
Williams, M.D., Installation and start-up of the PDX neutral beam injection system, 8:25081 (J;US)
Role of conceptual models in nuclear power plant operation, 8:23563 (RA;US)
See Kozub, T., 8:25102
Williams, M.L., Incorporation of clad effects into Sauer's method for computing Dancoff factors, 8:23548 (J;GB)
Wilmot, E.L., *See* Madsen, M.M., 8:23117
Wilson, H.W., Fuel performance characteristics at extended burnup, 8:23475 (RA;US)
Wilson, J.H., Safety procedures for the MFTF sustaining neutral beam power supply, 8:25072 (J;US)
Wilson, J.R., *See* Foster, J.S., 8:23753
Wilson, J.V., MSF21;VTE21; desalination plant optimization, 8:24088 (R;US)
See Fowler, T.B., 8:24093
Wilson, K.L., *See* Baskes, M.I., 8:24901
Wilson, M.F., Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B;CA)
Wilson, M.N., *See* Braginski, A.I., 8:24128
Wilson, R.E., *See* Braid, T.H., 8:23587
Wilson, W.I., Standardized test methods for investigating attrition and elutriation characteristics of natural sorbents in fluidized-bed coal combustors, 8:24149 (R;US)
See Johnson, I., 8:24148
Winkhaus, G., *See* Kuehn, L., 8:22944
Winkle, W.V., *See* Fowler, T.B., 8:25250
Winkleman, B.C., Evaluation of a modified-line-reversal temperature measurement in coal-fired MHD plasmas, 8:23774 (R;US)
Winkler, P., Design and analysis of the TFTR fixed limiters - 1, 8:25201 (J;US)
Design and analysis of the TFTR fixed limiters - 2, 8:25202 (J;US)
Winn, J.S., *See* Grieman, F.J., 8:24565
Winske, D., Synchrotron emission from a relativistic loss-cone distribution with application to the ELMO Bumpy-Torus Experiment, 8:24785 (J;US)
Winstein, B., Experiments in the kaon system, 8:24580 (RA;US)
Winter, J.R., Analysis of a heat-transfer fluid fill pipe failure, 8:23914 (RA;US)
Wisner, S.B., *See* Davies, J.H., 8:23460
Wisniewski, J., *See* Kinsman, J.D., 8:24237
Wissler, K., Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23802 (R;DE;In German)
Withrow, C., PLANMAP.REV1; plots geochemical data in plan, 8:23365 (R;US)
SECTION.REV1; plot geochemical drill hole data, 8:23379 (R;US)
Witschi, H.R., Systemic toxicology, 8:24442 (RA;US)
Witt, H.T., Effect of the electrical field in the membrane of photosynthesis. Final report, 8:24479 (R;US)
Wittkopf, W.A., *See* Newman, L.W., 8:23492
Wixson, B.G., *See* Kearney, W.M., 8:24245
Wobbe, C.R., *See* Jacobson, K.B., 8:24412
See Mitra, S., 8:24310
Wohletz, K.H., Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences, 8:24491 (R;US)
Wohlgemuth, J.H., Module experimental process system development unit (MEPSDU). Summary technical report, November 26, 1980-February 23, 1982, 8:23268 (R;US)
Woldseth, R., X-ray fluorescence/X-ray energy analysis as a trace element tool, 8:24324 (J;US)
Wolf, D., Formation energy of point defects in free surfaces and grain boundaries in MgO, 8:24000 (R;US)
Wolf, J.J., *See* Siegel, A.I., 8:23565
Wolfer, W.G., Melt layer stability following a plasma disruption, 8:24894 (J;NL)
See Hassanein, A.M., 8:24893
See Peterson, R.R., 8:24890
See Watson, R.D., 8:24827
Wolff, J.J., *See* Cash, D.J., 8:24489
Wolff, U., Fuel performance experience of high burnup fuel in RWE reactors, 8:23480 (RA;US)
See Hoffmann, H., 8:23532
Wolford, D.J., *See* Meyerson, B.S., 8:24036
Wollersheim, H.J., *See* Wilcke, W.W., 8:24685
Wolosewicz, R.M., *See* Cheng, C.F., 8:23315
Wolsky, A.M., Disaggregation, input-output analysis, and energy impacts, 8:23685 (R;US)
Wong, C.P.C., Low activation blanket for the moving ring field-reversed mirror reactor, 8:24978 (J;US)

TRACT reactor blanket study, 8:24977 (J;US)
See Hopkins, G.R., 8:24934
Wong, G.T.F., Fate of chlorine in seawater. Final report, August 1, 1977-January 31, 1981, 8:24268 (R;US)
Wong, K.M., *See* Noshkin, V.E., 8:24295
Wong, R.L., TMX-axisymmetric magnet set design study, 8:24985 (J;US)
See Pedrotti, L.R., 8:24845
Wood, J.C., *See* Cox, B., 8:23920
Wood, J.E., BWR high burnup licensing assessment, 8:23461 (RA;US)
Wood, M.H., *See* Cowking, C.B., 8:23590
See Tylka, J.P., 8:23593
Wood, M.I., Experimental investigation of sodium bentonite stability in Hanford basalt, 8:23174 (R;US)
Wood, R.F., *See* Lowndes, D.H., 8:24038
Wood, W.A., *See* Trautmann, C.H., 8:23437
Woodfin, R.L., Full-scale turbine-missile concrete impact experiments. Final report, 8:23610 (R;US)
Woodhouse, E.J., *See* Walker, C.A., 8:23177
Woods, A., *See* Lee, S., 8:23466
Woods, D.D., Visual momentum: an example of cognitive models applied to interface design, 8:23560 (RA;US)
Woods, W.J., *See* Cowking, C.B., 8:23590
See Tylka, J.P., 8:23593
Woolley, R.D., Control and data acquisition systems for the S-1 spheromak, 8:25182 (J;US)
See Mathe, P., 8:25183
Woolley, S.G., *See* Wade, J.E., 8:23388
Woosley, S.E., Gamma-line astronomy, 8:24507 (J;GB)
Wooten, F., *See* Goldberg, A., 8:24037
Wooton, A.J., Gettering in ISX-B, 8:24879 (J;NL)
Worlton, T.G., *See* Crawford, R.K., 8:24172
See Haumann, J.R., 8:24173
Worrell, W.L., *See* Misra, A.K., 8:24066
Wright, A.E., *See* Tylka, J.P., 8:23593
Wright, J.M., PHOS1; pH & conductivity of sodium phosphate solutions, 8:24055 (R;US)
Wright, K.E., Fast shutter valve for TFTR neutral beam lines, 8:25128 (J;US)
See Tasoulias, G.W., 8:25117
Wright, R.R., *See* Arnold, J.B., 8:23976
Wrighton, M.S., Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, September 15, 1981-November 29, 1982, 8:23264 (R;US)
Wrobel, J.R., *See* Gagliardi, C., 8:24644
Wrona, B.J., *See* Newman, L.W., 8:23492
Wu, C.S., Statistical acceleration of electrons by lower-hybrid turbulence, 8:24806 (J;GB)
Wyant, F.J., Summary of the Plant Electrical Systems (PES) Study, 8:23550 (R;US)
Wyant, F.R., Argonne Energy Model - Portugal, 8:23692 (R;US)
Wyder, P., *See* Arko, A.J., 8:23888
Wyuveen, R.A., *See* Cooke, R.H., 8:24175
Wysor, R.B., *See* Ballou, J.K., 8:24125

X

Xerikos, P.B., *See* Irving, P.M., 8:24406

Y

Yamasauchi, F., Process for removal of organic solvents, 8:24054 (TG;US)
Yamada, M., *See* Ando, Y., 8:24643
See Hsu, W.L., 8:24858
Yamada, R., Thermal fatigue testing of low-Z coatings on molybdenum and Inconel 625, 8:24907 (J;NL)
See Nakamura, K., 8:24906
Yamada, T., *See* Naito, T., 8:23199
Yamaguchi, K., Compact tritium removal equipment for air cleanup of glove box, 8:25124 (J;US)
Yamamoto, M., *See* Kajiura, S., 8:25212
Yamanaka, T., *See* Naito, T., 8:23199
See Ninomiya, M., 8:23133
Yanagiawa, I., *See* Kasai, M., 8:24935
Yanagisawa, K., *See* Ichikawa, M., 8:23454
Yang, J.W., Hydrogen combustion during degraded core accidents in PWR ice condenser plants, 8:23655 (J;US)
Yang, L., *See* Homeyer, W.G., 8:24980
Yang, R.J., *See* Yeung, W.S., 8:24140
Yang, S., *See* Duan, W., 8:24884
Yang, T.F., Direct energy converter for UW tandem mirror reactor, 8:25134 (J;US)
See Morgan, G.D., 8:25210
Yang, W.K., Molecular genetics of carcinogenesis, 8:24387 (RA;US)
Yano, K., *See* Noda, N., 8:24883
See Sakamoto, Y., 8:24880
Yao, N.P., *See* Jorgensen, J.D., 8:23684
See Lee, J., 8:23884
See Miller, J.F., 8:23676
Yarbrough, D.W., *See* Fine, H.A., 8:23834
Yarrington, P., Development and evaluation of a graphic display system for BWRs, 8:23571 (J;US)
Yast, E.C., *See* Anderson, M.A., 8:24279
Yasukochi, K., *See* Ogasawara, T., 8:25041
Yauger, R.L., *See* Bowman, R.C. Jr., 8:24010
Yavorsky, P.M., *See* Rogers, S., 8:22927
See Rogers, S.E., 8:22916
Yeboah, Y.D., *See* Longwell, J.P., 8:22902
Yee, D., *See* Brown, P.D., 8:23534
See Churlik, D.G., 8:23535
Yefimov, V.I., *See* Vorobyev, Y.I., 8:24343
Yeh, J.T., Experimental evaluation of spray-dryer flue-gas desulfurization for use with Eastern US coals, 8:23428 (R;US)
See Demski, R.J., 8:22945, 8:22953
Yette, M.L., *See* Niyogi, S.K., 8:24313
Yeung, W.S., Application of the method of integral relations to the calculation of two-dimensional incompressible turbulent boundary layer, 8:24140 (J;US)
Yokomizo, H., *See* Shimada, M., 8:24866
See Shinya, K., 8:25058
Yonekawa, I., *See* Hosogane, N., 8:25179
Yoo, M.H., Crack and cavity nucleation at interfaces during creep, 8:23938 (R;US)
Yose, A.B. II, Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R;US)
Yoshida, H., *See* Shinya, K., 8:25058
Yoshimura, H.R., *See* Huerta, M., 8:24111
Yoshino, R., *See* Hosogane, N., 8:25179
Young, C., Evaluation of stimulation technologies in the Eastern Gas Shales Project, 8:23073 (R;US)
Young, C.E., *See* Gruen, D.M., 8:24521
See Pellin, M.J., 8:24812
Young, E.G., *See* Barker, L.M., 8:24092
Young, P.G., GNASH; particle induced cross-sections & spectra, 8:24671 (R;US)
Young, R.A., *See* Berk, J.V., 8:23832
Young, R.T., Effect of lithium diffusion into polycrystalline Si solar cells, 8:23288 (J;US)
Youngberg, A.D., Depositional environments, subsurface stratigraphy, and post-burn characterization of the Paleocene-Eocene Hanna Formation at the Hanna, Wyoming underground coal-gasification site: Hanna II Phase 1 experiment, 8:22923 (R;US)
Youngdahl, C.K., PTA1; pipe system pressure analysis, 8:23510 (R;US)
Younger, S.M., Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence, 8:24554 (J;US)
Yow, J.L. Jr., Sources of compass error in tunnel mapping, 8:24495 (J;US)
Yu, D., *See* Hartwig, K.T., 8:25048
Yugo, J.J., Quasi-optical ECRH beam system for MFTF-B, 8:24776 (R;US)
Yung, Y.L., Research in atmospheric chemistry and transport. Final report, 15 Sep 1978-14 Jan 1982, 8:24238 (R;US)

Z

Zabel, H., *See* Wada, N., 8:24032
Zabransky, B.J., *See* Schneider, D., 8:24557
Zabranzky, B., *See* Vager, Z., 8:24542
Zabriskie, J.M., *See* Larson, T.K., 8:23658
Zacharakis, T.G., Geothermal-resource assessment of Ranger Warm Spring, Colorado. Resources Series 24, 8:23369 (R;US)
See Pearl, R.H., 8:23368
Zadzielski, E., *See* Bogden, J.D., 8:24345
Zaider, M., *See* Brenner, D.J., 8:24727
Zaidi, B.R., *See* Sasscer, D.S., 8:23310
Zaloudek, F.R., Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R;US)
Zaluzec, N.J., Influence of detector geometry on AEM-based x-ray microanalysis. I. Theoretical, 8:24046 (R;US)
Zandt, G., Seismic baseline and induction studies: Roosevelt Hot Springs, Utah and Raft River, Idaho, 8:23370 (R;US)
Zaragoza, G.J., *See* Suski, G.J., 8:25151
Zardecki, A., Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants, 8:24726 (R;US)

Zavala Rodriguez, P., Upgrading of waste material from coal washeries, 8:22956 (R;MX;In Spanish)
Zedlker, M.S., Nuclear pumping of O/sub 2/(/sup 1//delta/) for laser fusion reactors, 8:25154 (J;US)
Zehlein, H., Finite element analyses and instrumentation layout for the superconducting test facility TOSKA, 8:25013 (J;US)
See Krauth, H., 8:25055
Zeitlin, B.A., *See* Hamilton, W.C., 8:25019
Zeitz, W.D., *See* Alber, D., 8:24676
See Bertschat, H.H., 8:23960
See Devare, H.G., 8:23956
Zenke, B., *See* Dauber, E., 8:23849
Zerbin, W.O., *See* Ide, J., 8:23226
Zerwas, P.M., *See* Peterson, C., 8:24625
Zetti, A., *See* Kaper, H.G., 8:24722
Zeuch, W.R., *See* Wana, C.Y., 8:23642
Zhou, B.L., *See* Pellegrino, J., 8:23985
Zhurakhovskii, V.A., Electron flow generation of energy in a field of two transverse electromagnetic type waves. Preprint 218, 8:24750 (R;UA)
Zidek, W., *See* Zumkley, H., 8:24462
Ziegenbein, B., *See* Birnbreier, H., 8:23357
Ziegler, K., *See* Arndt, P., 8:24161
See Busse, W., 8:24181
Zielen, A.J., *See* Fowler, T.B., 8:23187
Ziem, P., *See* Drescher, B., 8:25272
Ziman, G.M., *See* Orren, L.H., 8:23376
Zimmerman, E., *See* Wilkey, M., 8:23873
Zimmerman, R.E., World trends in coal preparation, 8:22990 (R;MX)
Zinkl, R.J., *See* Hardy, L.C., 8:23099, 8:23100
See Shettel, D.L. Jr., 8:23098
Zinn, J., *See* Sutherland, C.D., 8:24508
Ziock, H.J., *See* Ellis, R.J., 8:24650
Ziock, K.O.H., *See* Ellis, R.J., 8:24650
Ziolkowski, R.W., *See* Yugo, J.J., 8:24776
Zolliker, P., *See* Hartwig, K.T., 8:25048
Zubair, K.M., Development of a high voltage crowbar, 8:25066 (J;US)
Zuckerman, D.S., Optimization studies of a commercial EBTR power plant, 8:24929 (J;US)
Znelow, H.V., *See* Doenitz, W., 8:23203
Zumdieck, J.F., *See* Wong, C.P.C., 8:24977
Zumkley, H., Zinc and magnesium concentrations in plasma and red blood cells in patients on digitalis medication, 8:24462 (J;US)
Zuvers, H., *See* Bellomo, P., 8:25075
See Faulkner, F.K., 8:25077
Zvirin, Y., *See* Vadasz, P., 8:24503
Zyduck, R.C., *See* Newton, R.A., 8:23561

SUBJECT INDEX

The subject index is based on the use of subject descriptors selected from a controlled thesaurus of terms (DOE/TIC-7000). Subject descriptors and qualifiers (subheadings) are selected and presented in the following format:

SUBJECT DESCRIPTOR
Qualifier
Title, (supplementary information), citation number, (R:US)

The notations in the final parentheses indicate the type of document, e.g., R for Report; the country of publication, e.g., US; and the language if other than English, e.g., In German. Tables of document types and country of publication codes appear after the indexes.

The title may be supplemented with additional words, or a phrase, if it appears additional information would be helpful. In cases for which the title contains little or no information related to the subject entry, it may be replaced entirely by the supplementary information. A qualifier is not always required, and in such cases the title will follow the unqualified subject descriptor.

The descriptors selected for use as subject terms are generally the names of specific materials, things, or processes. To the extent possible, a qualifier is selected to describe the properties of, or processes applied to, the subject term.

Index entries are selected to indicate the important ideas and concepts presented in a document, rather than words that may appear in the text. Within the available thesaurus terms, the most probable or logical place to look for typical information is selected. "See references" are included to guide users from synonymous terms or phrases to the descriptor selected as a subject heading for the concept. (e.g. Pipeline Quality Gas see HIGH BTU GAS). "See also references" are used to indicate where to find references to subject concepts that are narrower, broader, or related to a particular subject heading. To complete an exhaustive search of a given subject, all such headings should be reviewed. Copies of DOE/TIC-7000, the Subject Thesaurus, are available from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, VA 22161.

A

A2-1310 RESONANCES
Particle Production
Study of A_3 production in the reaction $\pi^- p \rightarrow K^0 K^- p$ at 50, 100, and 175 GeV/c, 8:24601 (J:US)

ABANDONED SITES
Decommissioning
Final environmental impact statement for remedial action standards for inactive uranium processing sites (40 CFR 192) Volume I. Final report, 8:23186 (R:US)
Decontamination
Final environmental impact statement for remedial action standards for inactive uranium processing sites (40 CFR 192) Volume I. Final report, 8:23186 (R:US)

A-BOMB SURVIVORS
Delayed Radiation Effects
Breast cancer among atomic bomb survivors, Hiroshima and Nagasaki, 1950-1969. Pathologic features, 8:24357 (R:US)
Genetic Radiation Effects
Area program in population genetics. Final report, November 1, 1975-August 31, 1982, 8:24366 (R:US)
Prenatal Exposure
Utilization of critical periods during development to study the effects of low levels of environmental agents, 8:24385 (RA:US)

ABSORBED FRACTION (INTERNAL IRRADIATION)
See INTERNAL IRRADIATION

ABSORBERS (SOLAR)
See SOLAR ABSORBERS

ACCELERATOR FACILITIES
See also TARGET CHAMBERS
Radiation Protection
Some specialized radiological-safety considerations at Argonne National Laboratory's Heavy Ion Research Facility (SAR, Shielding Design, Q.F.'s, HIRC), 8:24175 (R:US)

ACCELERATORS
See also COLLECTIVE ACCELERATORS
HEAVY ION ACCELERATORS
LINEAR ACCELERATORS
MESON FACTORIES
Beam Dynamics
EGUN; calculation of electron trajectories (IBM370,303x,3081; FORTRAN IV (99%) and Assembler (1%)), 8:24167 (R:US)
Specifications
High intensity accelerator facility, 8:24162 (RA:US)

ACCIDENTAL INTAKE
See ACCIDENTS

ACCIDENTAL IRRADIATION
See RADIATION ACCIDENTS

ACCIDENTS
See also RADIATION ACCIDENTS
REACTOR ACCIDENTS
Cardiopulmonary Resuscitation
Definitive studies on pole-top resuscitation. Final report, 8:24481 (R:US)

ACES
See QUARKS

ACETYLENE
Combustion
Infrared absorption spectroscopy with color-center lasers. Progress report, April 1 1982-February 15, 1983, 8:24081 (R:US)
Polarons
Polarons in quasi-one-dimensional systems, 8:24024 (J:US)
Vibrational States
Local mode predictions for excited stretching vibrational states of HCCD and H ^{13}C ^{13}CH, 8:24552 (J:US)

ACID ELECTROLYTE FUEL CELLS
Design
Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978, 8:23790 (R:US)
Feasibility Studies
Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978, 8:23790 (R:US)
Performance Testing
Development of a crude gas/air fuel cell system, 8:23783 (R:DE:In German)

ACID RAIN
Atmospheric Chemistry
Inventory of acid-deposition research projects funded by the private sector. Final report, 8:24237 (R:US)
Environmental Effects
Summary of observations from the investigation of the sediments of Panther, Sagamore and Woods, 8:24286 (RA:US)
Trace element and polycyclic aromatic hydrocarbon levels in sediment cores from Sagamore and Woods Lakes, 8:24288 (RA:US)

Environmental Impacts
Inventory of acid-deposition research projects funded by the private sector. Final report, 8:24237 (R:US)
Environmental Transport
Inventory of acid-deposition research projects funded by the private sector. Final report, 8:24237 (R:US)
Legislation
Analysis of proposed legislation to control acid rain, 8:24255 (R:US)
Mathematical Models
Overview of the integrated lake-water acidification study (ILWAS), 8:24281 (RA:US)
Meetings
Integrated lake-watershed acidification study: proceedings of the ILWAS annual review conference (Lead abstract), 8:24280 (R:US)
Monitoring
Inventory of acid-deposition research projects funded by the private sector. Final report, 8:24237 (R:US)
Research Programs
Inventory of acid-deposition research projects funded by the private sector. Final report, 8:24237 (R:US)

ACIDIFICATION
Environmental Effects
Allochthonous litter decomposition in three Adirondack lakes, 8:24284 (RA:US)
Lake acidification: its effect on lead mobility in the sediment of two Adirondack lakes, 8:24289 (RA:US)
Seasonal Variations
Lake acidification during spring snowmelt: processes and causes, 8:24285 (RA:US)

ACIDS (ORGANIC)
See ORGANIC ACIDS

ACQUISITION (DATA)
See DATA ACQUISITION

ACTINIDE COMPOUNDS
Electronic Structure
Spectroscopic properties of the f-elements in compounds and solutions (79 references), 8:24078 (R:US)
Energy Levels
Spectroscopic properties of the f-elements in compounds and solutions (79 references), 8:24078 (R:US)
Excited States
Spectroscopic properties of the f-elements in compounds and solutions (79 references), 8:24078 (R:US)

ACTINIDE NUCLEI
See also ACTINIUM 215
ACTINIUM 217
AMERICIUM 241
CALIFORNIUM 252
NEPTUNIUM 237
PLUTONIUM 238
PLUTONIUM 239
PLUTONIUM 240
THORIUM 230
THORIUM 234
URANIUM 226
URANIUM 230
URANIUM 234
URANIUM 235
URANIUM 238
Band Theory
Band model for d- and f-metals, 8:23946 (R:US)
Fermi Level
Band model for d- and f-metals, 8:23946 (R:US)

ACTINIDES
See also AMERICIUM
CURIUM
PLUTONIUM
URANIUM
Adsorption
Actinide sorption on rock minerals, 8:23146 (RA:DE)
Chemisorption
Actinide sorption on rock minerals, 8:23146 (RA:DE)
Solubility
Actinide-solubility controls in performance assessment of nuclear-waste repositories, 8:23168 (R:US)

ACTINIUM 215
Yrast States
Spectroscopy of ^{215}Ac and systematics of the N = 126 isotones, 8:24698 (RA:DE:In German)

ACTINIUM 217
Alpha Decay
Perturbed angular distribution in the α-decay; g-factor measurements and spectroscopy of ^{217}Ac, 8:24699 (RA:DE:In German)

ACTIVATED CARBON
Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R:US)
Radiation Heating
CHART; iodine decay heat on charcoal adsorbers (IBM360,370,303x; FORTRAN IV), 8:23583 (R:US)
Recovery
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R:US)
Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R:US)
Regeneration
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R:US)
Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R:US)
Thermal Analysis
CHART; iodine decay heat on charcoal adsorbers (IBM360,370,303x; FORTRAN IV), 8:23583 (R:US)

ACTIVATED SLUDGE PROCESS
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
Nutrients
Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R:US)

ACTIVATION DETECTORS
Data Analysis
Comparison between LYRA and SAND code performance for the extrapolation of data from activation detectors used for determining spectra of acceleration neutrons, 8:24203 (R:IT)

ACTIVITY LEVELS
Calibration
Assessment of surrogate structures for whole body counting, 8:24735 (RA:US)
Regression Analysis
Application of a multiple least-squares regression program to dual energy NaI-CsI(T1) measurements, 8:24368 (RA:US)

ADENOCARCINOMAS
See CARCINOMAS

ADENOSINE MONOPHOSPHATE
See AMP

ADIPIC ACID
Decomposition
Effect of trace metals and sulfite oxidation of adipic acid degradation in FGD systems. Final report Dec 81-May 82, 8:22957 (R:US)

ADMINISTRATIVE PROCEDURES
Recommendations
Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study, 8:23727 (R:US)

ADSORBENTS
See also ACTIVATED CARBON
SILICA GEL
Aluminium Oxides
Investigations on the improvement of activated alumina adsorbents, 8:24060 (R:DE:In German)
Comparative Evaluations
Experimental evaluation of spray-dryer flue-gas desulfurization for use with Eastern US coals, 8:23428 (R:US)
Iodine-fixation studies at the Pacific Northwest Laboratory, 8:23165 (R:US)

AEROSOLS
See also RADIOACTIVE AEROSOLS
Chemical Composition
Visibility and the chemical composition of aerosols in air masses over Lake Michigan. Paper 81.21.5, 8:24254 (J:US)

Deposition
Wet and dry surface deposition of air pollutants and their modeling, 8:24230 (R:US)
Filtration
Particle size for greatest penetration of HEPA filters - and their true efficiency, 8:24244 (R:US)

AFFIRMATIVE ACTION
Implementation
Implementing affirmative action in conservative times, 8:25232 (R:US)

AFTER-HEAT REMOVAL
Natural Convection
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)

AGED
See ELDERLY PEOPLE

AGRICULTURAL RESIDUES
See AGRICULTURAL WASTES

AGRICULTURAL WASTES
See also MANURES
1981 Winter Meeting - American Society of Agricultural Engineers, 8:23868 (J:US)
Gasification
Energy recovery by gasification of agricultural and forestry wastes in a co-current moving bed reactor. Final report, 8:23274 (R:US)
Resource Potential
Production of cereal straw and corn stalks for energy purposes. Photosynthetic production of organic matter, 8:23271 (R:XE:FR)
Uses
Refeeding biogas digester solids, 8:23289 (J:US)

AGRICULTURE
Energy Conservation
1981 Winter Meeting - American Society of Agricultural Engineers, 8:23868 (J:US)
Energy Consumption
Straw processing, 8:23864 (R:DE:In German)
Meetings
1981 Winter Meeting - American Society of Agricultural Engineers, 8:23868 (J:US)

AIR
See also SURFACE AIR
Electron-Molecule Collisions
Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets, 8:24546 (R:US)

AIR CONDITIONERS
Energy Efficiency
Effects of cyclic response of residential air conditioners on seasonal performance, 8:23840 (J:US)
Performance Testing
Effects of cyclic response of residential air conditioners on seasonal performance, 8:23840 (J:US)

AIR CONDITIONING
See also SOLAR AIR CONDITIONING
Measuring Methods
DOE test procedure setup measurement errors: part 1, 8:23839 (J:US)
Performance Testing
DOE test procedure setup measurement errors: part 1, 8:23839 (J:US)

AIR POLLUTION
Bibliographies
Air pollution by sulfur dioxide, 8:24240 (R:DE:In German)
Biological Effects
Analysis of health effects resulting from population exposures to ambient particulate matter. Appendices to the annual progress report, July 16, 1982-March 15, 1983, 8:24409 (R:US)
Diffusion
Two-dimensional dynamical drainage-flow model with Monte Carlo transport and diffusion calculations, 8:24234 (R:US)
Environmental Effects
Atmospheric cycles of nitrogen oxides and ammonia, 8:24239 (R:US)
Wet and dry surface deposition of air pollutants and their modeling, 8:24230 (R:US)
Environmental Transport
Intercomparison of MAP3S models of long-range transport and deposition, 8:24231 (R:US)
Foliar Uptake
POLUTE; forest air pollutant uptake model (IBM360,370; CSMP), 8:24301 (R:US)
Health Hazards
Analysis of health effects resulting from population exposures to ambient particulate matter. Annual progress report, July 16, 1982-March 15, 1983, 8:24407 (R:US)
Epidemiologic investigation of the mercury excretion in the urine of children living in an area of industrial concentration (Western Ruhr District), 8:24410 (R:DE:In German)
Mathematical Models
Denser-than-air dispersion modeling in the atmosphere, 8:23071 (R:US)
Determination of environment parameters for SELPE, a model for energy supply (Netherlands), 8:22959 (R:NL:In Dutch)
Seasonal Variations
Seasonal patterns of sulfate and nitrate in precipitation in the United States. Paper 81.6.1, 8:24226 (J:US)

AIR POLLUTION ABATEMENT
Economic Impact
Analysis of proposed legislation to control acid rain, 8:24255 (R:US)
Environmental Impacts
Analysis of proposed legislation to control acid rain, 8:24255 (R:US)

AIR POLLUTION MONITORS
Performance Testing
Real-time total-mass analysis of particulates in the stack of an industrial power plant, 8:24242 (R:US)
State-of-the-art of commercially available personal monitors for NO/sub x/, SO_2 and particulate matter in ambient air, 8:24246 (J:US)

AIR QUALITY
Mathematical Models
Survey of plume models for atmospheric application, 8:24225 (R:US)

AIR SAMPLERS
Performance Testing
Mechanical-reliability evaluation of a proposed emergency-response radioiodine air sampler, 8:24249 (R:US)

AIR SOURCE HEAT PUMPS
Internal Combustion Engines
Energy conservation by gas-fulled heat pumps for hot water space heating systems, 8:23803 (R:DE:In German)
Performance Testing
Energy conservation by gas-fulled heat pumps for hot water space heating systems, 8:23803 (R:DE:In German)

AIR TRANSPORT
Government Policies
Receipt and use of half-fare airline coupons at selected Department of Energy field locations, 8:25229 (R:US)
Recommendations
Receipt and use of half-fare airline coupons at selected Department of Energy field locations, 8:25229 (R:US)

AIRBORNE PARTICLES
See PARTICULATES

AIRBORNE PARTICULATES
See PARTICULATES

AIRCRAFT
Acoustic Emission Testing
Fatigue-crack monitoring in-flight using acoustic emission - hardware, technique, and testing, 8:24142 (R:US)
Fabrication
Possibilities of welding as a joining process in airframe construction, 8:24130 (TJ:US)
Flight Testing
Fatigue-crack monitoring in-flight using acoustic emission - hardware, technique, and testing, 8:24142 (R:US)
Welded Joints
Possibilities of welding as a joining process in airframe construction, 8:24130 (TJ:US)

AIRCRAFT ACCIDENTS
See ACCIDENTS

ALAP
See RADIATION PROTECTION
ALARM DOSEMETERS
See RADIATION MONITORS
ALASKA
Uranium Deposits
Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23098 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R:US)
ALCATOR DEVICE
Data Acquisition Systems
High speed digital data acquisition system on Alcator, 8:25193 (J:US)
Limiters
Design of actively cooled limiters for Alcator A and C, 8:25210 (J:US)
ALCOHOL FUEL CELLS
Electrodes
Electrodes and diaphragms for fuel cells, 8:23784 (R:DE:In German)
ALCOHOLS
See also GLYCOLS
METHANOL
PROPANOLS
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
ALDEHYDO ACIDS
See CARBOXYLIC ACIDS
ALFALFA
Drying
Commercial scale production of alfalfa leaf protein concentrate, 8:23869 (J:US)
ALFVEN WAVES
R.f. system for Alfven wave heating of the TCA tokamak, 8:24926 (J:US)
Kinetic Equations
Kinetic theory of Alfven waves, 8:24762 (R:US)
Plasma Heating
Alfven wave heating in general toroidal plasmas, 8:24784 (J:US)
Resonance Absorption
Alfven wave heating in general toroidal plasmas, 8:24784 (J:US)
ALGAE
See also DIATOMS
Cultivation Techniques
Organisms and compounds of unnatural isotopic composition in NMR, 8:24348 (R:US)
Growth
Recherche d'une biotechnologie solaire basee sur la culture continue de cellules photosynthetiques (Research on a solar biotechnology based on the continuous culture in photosynthetic cells). Final report, 8:23276 (R:US)
Production
Solar biotechnology: microalgae production in tubular photoreactors for energy and chemicals, 8:23260 (R:FR)
ALKALI METALS
See also CESIUM
LITHIUM
POTASSIUM
RUBIDIUM
SODIUM
Surface Coating
Analysis of the plasma impurity influx from alkali-metal coatings for fusion reactor applications, 8:24877 (J:NL)
ALKANOIC ACIDS
See CARBOXYLIC ACIDS
ALKENOIC ACIDS
See CARBOXYLIC ACIDS
ALKYLATES
See ALCOHOLS
ALKYLATING AGENTS
See also ENDOXAN
Genetic Effects
Mammalian biochemical genetics (X radiation and mutagens), 8:24379 (RA:US)
ALLOCATIONS
Implementation
Allegations of improper supplier practices affecting gasoline lines at independent stations, 8:23042 (R:US)
ALLOY 800
See INCOLOY 800
ALLOY-HD-8077
See NICKEL BASE ALLOYS
ALLOY-MA-754
See NICKEL BASE ALLOYS
ALLOY-MA-956
See IRON BASE ALLOYS
ALLOYS
See also ALUMINIUM ALLOYS
BISMUTH ALLOYS
BORON ALLOYS
CHROMIUM ALLOYS
COBALT ALLOYS
COPPER ALLOYS
GERMANIUM ALLOYS
HAFNIUM ALLOYS
HEAT RESISTING ALLOYS
IRON ALLOYS
LEAD ALLOYS
LITHIUM ALLOYS
MAGNESIUM ALLOYS
NICKEL ALLOYS
NIOBIUM ALLOYS
TANTALUM ALLOYS
TITANIUM ALLOYS
VANADIUM ALLOYS
ZINC ALLOYS
ZIRCONIUM ALLOYS
Corrosion
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Creep
Crack and cavity nucleation at interfaces during creep, 8:23938 (R:US)
DEsign for elevated temperature environmetns: some current problems and concerns, 8:23924 (RA:US)
Electronic Structure
SCF-X alpha-SW cluster molecular-orbital models of catalysts, alloys, magnetic materials, and superconductors. Interim report, 8:23891 (R:US)
Fatigue
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Mechanical Properties
Directionally solidified eutectic superalloys for stationary gas turbines, 8:23407 (R:DE:In German)
Meetings
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Physical Radiation Effects
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Radiation Effects
Radiation effects in metallic alloys, 8:23918 (RA:US)
Stability
Thermal stability data of amorphous binary alloys, 8:23988 (J:US)
Temperature Effects
Thermal stability data of amorphous binary alloys, 8:23988 (J:US)
ALLOY-WAZ-16
See NICKEL BASE ALLOYS
ALLUVIAL DEPOSITS
Mineralogy
Distribution and characteristics of surficial geologic materials in the ILWAS watershed, 8:24282 (RA:US)
Permeability
Distribution and characteristics of surficial geologic materials in the ILWAS watershed, 8:24282 (RA:US)

ALPHA PARTICLE MODEL
See CLUSTER MODEL
ALPHA REACTIONS
Elastic Scattering
Error propagation in fitting optical potentials to elastic heavy-ion scattering, 8:24655 (RA:DE:In German)
Error propagation in the phase analysis of elastic scattering data, 8:24656 (RA:DE:In German)
ALPHA-BEARING WASTES
Leaching
Leach tests of simulated low-level transuranic waste forms containing transuranic elements, 8:23124 (R:US)
ALTERNATE FUELS
See FUEL SUBSTITUTION
SYNTHETIC FUELS
ALUMINIA
See ALUMINIUM OXIDES
ALUMINIUM
Absorption Spectra
Oscillator strength sums and effective electron number in optical spectroscopy of solids, 8:24560 (BA:US)
Biological Fouling
OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J:US)
Corrosion
Corrosion problems associated with solar fluid and components, 8:23315 (R:US)
OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J:US)
Corrosion Fatigue
Environmental effects on fatigue crack initiation and early propagation, 8:23907 (RA:US)
Corrosion Resistance
Evaluation of the effect of anions on the corrosion of aluminum in water, 8:23989 (TJ:US)
Crack Propagation
Environmental effects on fatigue crack initiation and early propagation, 8:23907 (RA:US)
Degassing
Initial thermal outgassing properties of aluminium between 20/degree/c and 320/degree/c, 8:25161 (J:US)
Electronic Structure
Electronic structure and formation energy of a vacancy in aluminum, 8:23937 (R:US)
Electron-Positron Collisions
Positron-annihilation characteristics in real solids including many-body enhancement effects, 8:24721 (R:US)
Erosion
Arc velocity and erosion for stainless steel and aluminium cathodes, 8:24886 (J:NL)
Interstitials
Symmetry of an indium-vacancy complex in coldworked aluminium, 8:23961 (RA:DE:In German)
Ion-Atom Collisions
Target thickness and density effects for inner shell excitation in near symmetric collision-systems, 8:24544 (RA:DE:In German)
Mechanical Properties
Surface segregation in binary alloy first wall candidate materials, 8:24904 (J:NL)
Oscillator Strengths
Oscillator strength sums and effective electron number in optical spectroscopy of solids, 8:24560 (BA:US)
Physical Radiation Effects
PAC investigation of the orientation of lattice defects in electron irradiated aluminium single crystals, 8:23962 (RA:DE:In German)
Point Defects
Moessbauer investigation of defect trapping at ^{57}Co in coldworked aluminium, 8:23963 (RA:DE:In German)
PAC investigation of the orientation of lattice defects in electron irradiated aluminium single crystals, 8:23962 (RA:DE:In German)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Vacancies
Positron-annihilation study of the equilibrium vacancy ensemble in aluminum, 8:23942 (R:US)
Positron-annihilation spectroscopy of vacancy defects in aluminum, 8:23939 (R:US)
Symmetry of an indium-vacancy complex in coldworked aluminium, 8:23961 (RA:DE:In German)
ALUMINIUM 27 TARGET
Neon 20 Reactions
Incomplete momentum transfer in fusion reactions, 8:24662 (RA:DE:In German)
ALUMINIUM ALLOYS
See also ALUMINIUM BASE ALLOYS
Brittle-Ductile Transitions
Role of grain size on the brittle-to-ductile transition of the strongly ordered alloy Ni_3Al: report on progress during year-2, 8:23952 (R:US)
Corrosion
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
Corrosion Resistance
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Crack Propagation
Crack growth retardation due to micro-roughness - a mechanism for overload effects in fatigue, 8:23986 (J:US)
Fatigue crack growth in aqueous and gaseous environments, 8:23903 (RA:US)
Fatigue
Fatigue crack growth in aqueous and gaseous environments, 8:23903 (RA:US)
Mechanical Properties
Role of grain size on the brittle-to-ductile transition of the strongly ordered alloy Ni_3Al: report on progress during year-2, 8:23952 (R:US)
Oxidation
Effect of trace alloying additions on the high-temperature oxidation of Al-4.2 wt % Mg and Al-3 wt % Li alloys, 8:23926 (RA:US)
Phase Transformations
Phase transitions in high magnetic fields, 8:23888 (R:US)
Physical Radiation Effects
Segregation in irradiated titanium alloys (Ion irradiation (2.1 MeV Ar^+) of Ti-6Al-4V, Ti-8Al-1V-Mo, Ti-3V and Ti-8.7 Al), 8:23931 (R:US)
ALUMINIUM BASE ALLOYS
Chemical Composition
Effect of retrogression and reaging treatment on the stress corrosion cracking susceptibility 7075-T6 aluminum alloy, 8:23911 (RA:US)
Embrittlement
Metallographic and fractographic aspects of liquid-metal embrittlement (Al-Zn-Mg (6.3% Zn 2.9% Mg); Ni 200 alloy (99.5% Ni); Inconel 601; D6AC steel), 8:23915 (RA:US)
Fractures
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)
Metallographic and fractographic aspects of liquid-metal embrittlement (Al-Zn-Mg (6.3% Zn 2.9% Mg); Ni 200 alloy (99.5% Ni); Inconel 601; D6AC steel), 8:23915 (RA:US)
Intergranular Corrosion
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)
Stress Corrosion
Effect of retrogression and reaging treatment on the stress corrosion cracking susceptibility 7075-T6 aluminum alloy, 8:23911 (RA:US)
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)
Tensile Properties
Effect of retrogression and reaging treatment on the stress corrosion cracking susceptibility 7075-T6 aluminum alloy, 8:23911 (RA:US)

ALUMINIUM COMPLEXES
Environmental Transport
Aluminum dynamics in the ILWAS watersheds, 8:24283 (RA:US)
Spatial Distribution
Aluminum dynamics in the ILWAS watersheds, 8:24283 (RA:US)
ALUMINIUM NITRIDES
Compacting
First quarterly report of the DARPA dynamic synthesis and consolidation program, 8:24008 (R:US)
ALUMINIUM OXIDES
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Chemical Activation
Investigations on the improvement of activated alumina adsorbents, 8:24060 (R:DE:In German)
Compacting
First quarterly report of the DARPA dynamic synthesis and consolidation program, 8:24008 (R:US)
Corrosion
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R:US)
Crystal Doping
Yttrium, an isoelectric donor in /alpha/-Al/sub 2/O/sub 3/, 8:24013 (J:US)
Electric Conductivity
Yttrium, an isoelectric donor in /alpha/-Al/sub 2/O/sub 3/, 8:24013 (J:US)
Environmental Transport
Aluminum dynamics in the ILWAS watersheds, 8:24283 (RA:US)
Recovery
Investigation of the use of coal-waste as raw-material for the production of aluminium, 8:22944 (R:DE:In German)
Spatial Distribution
Aluminum dynamics in the ILWAS watersheds, 8:24283 (RA:US)
Thermal Conductivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
Thermal Diffusivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
ALUMINUM
See ALUMINIUM
ALVEOLI (PULMONARY)
See LUNGS
AMBIENT TEMPERATURE
Climates
Environmental data for sites in the National Solar Data Network, 8:23249 (R:US)
Data Compilation
Environmental data for sites in the National Solar Data Network, 8:23251 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23248 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23250 (R:US)
AMERICAN BLACKS
See BLACK AMERICANS
AMERICIUM
Radiation Detection
Calibration of phoswich detectors for the in vivo measurement of americium, plutonium and uranium: interlaboratory comparison using the Lawrence Livermore calibration, 8:24733 (RA:US)
AMERICIUM 241
Calibration
Design and construction of a knee phantom for the calibration of Am-241 in bone, 8:24734 (RA:US)
Inventories
Byproduct inventories, 8:23171 (R:US)
Radionuclide Migration
Comparative behavior of plutonium and americium in the equatorial Pacific, 8:24295 (R:US)
AMES TEST
See MUTAGEN SCREENING
AMINES
See also NITROSAMINES
PIPERIDINES
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
Mutagen Screening
Mammalian cell genetic toxicology, 8:24416 (RA:US)
AMINO ACIDS
Organic acids containing both a basic amino group and an acidic carboxyl group.
See also TYROSINE
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
Synthesis
Synthesis of alpha-amino acids, 8:24071 (P:US)
AMINO ALCOHOLS
See ALCOHOLS
AMINES
AMINO SUGARS
See AMINES
AMINOGLYCIDES
See AMINES
AMMONIA
Atmospheric Chemistry
Atmospheric cycles of nitrogen oxides and ammonia, 8:24239 (R:US)
Chemical Reactions
Simultaneous removal of SO_2 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R:US)
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
Ecological Concentration
Biogeochemistry of trace metals in Chesapeake Bay. Final report, April 1, 1981-March 31, 1982, 8:24278 (R:US)
Gas Spills
Large-scale hazardous gas release experiments, 8:23069 (R:US)
Removal
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R:US)
AMMONIUM COMPOUNDS
Deposition
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
Washout
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
AMMUNITION
Aerodynamics
Analytical and experimental evaluation of a proposed self-forging fragment munition, 8:24216 (R:US)
Configuration
Analytical and experimental evaluation of a proposed self-forging fragment munition, 8:24216 (R:US)
AMP
Uptake
Dissolved cyclic adenosine monophosphate (cAMP) in the sea and uptake of cAMP by marine bacteria, 8:24351 (J:DE)
AMPHIBIANS
Aquaculture
Utilization of surface mine ponds in East Tennessee by breeding amphibians. Final report, 8:24454 (R:US)
ANAEROBIC DIGESTION
See also BIOGAS PROCESS
Residues
Refeeding biogas digester solids, 8:23289 (J:US)

ANALYZERS (PULSE)
See PULSE ANALYZERS
ANGIOGRAPHY
See BIOMEDICAL RADIOGRAPHY
BLOOD VESSELS
ANIMAL CELLS
Includes human cells.
See also TUMOR CELLS
Cell Differentiation
Regulation of gene expression, 8:24449 (RA:US)
Genetic Radiation Effects
Genetic effects of the decay of radionuclides in cells, 8:24396 (TG:US)
Sorting
Polycarbonate filter technique for collection of sorted cells, 8:24326 (J:US)
ANIMAL FEEDS
Processing
Straw processing, 8:23864 (R:DE:In German)
ANL
Accelerator Facilities
Some specialized radiological-safety considerations at Argonne National Laboratory's Heavy Ion Research Facility (SAR, Shielding Design, Q.F.'s, HIRC), 8:24175 (R:US)
Steam Generators
Start-up and performance of a high-sulfur dry-scrubber system, 8:22946 (R:US)
ANNULAR FUEL ELEMENTS
Specifications
Development of an extended burnup fuel assembly (PWR), 8:23488 (RA:US)
ANODES
See also PHOTOANODES
Fabrication
Method for uniformly distributing carbon flakes in a positive electrode, the electrode made thereby and compositions, 8:23683 (P:US)
Passivation
Effect of electrolyte water content on the anodic passivation of lithium in 1m lic104-propylene carbonate, 8:23669 (R:US)
Porous Materials
20 kW-fuel cell units by compact assembly. Pt. 4, 8:23787 (R:DE:In German)
ANTENNAS
Design
Icrf antenna design for a 3 MW, 3 s heating system on the TEXTOR tokamak, 8:25093 (J:US)
Mechanical aspects of the design of a lower hybrid frequency grill launcher for the Joint European Torus (J.E.T.), 8:25094 (J:US)
ANTIFERROMAGNETIC MATERIALS
Spin Waves
Spin waves at surfaces and steps in ferromagnets and antiferromagnets, 8:24741 (R:US)
ANTIMITOTIC DRUGS
See also BLEOMYCIN
Monoclonal Antibodies
Tumor cell surface proteins, 8:24321 (RA:US)
ANTIMUONS
See MUONS PLUS
ANTINEUTRINO-NUCLEON INTERACTIONS
See also ANTINEUTRINO-PROTON INTERACTIONS
Particle Production
Status of U.C. Irvine neutrino oscillation detector, 8:24586 (RA:US)
ANTINEUTRINO-PROTON INTERACTIONS
Deep Inelastic Scattering
Direct determination of the quark density ratio d(x)/u(x) in the proton from νp and anti νp interactions, 8:24604 (R:DE)
Particle Production
Grenoble neutrino experiment, 8:24585 (RA:US)
ANTINUCLEON BEAMS
See also ANTIPROTON BEAMS
Timing Properties
Antinucleon time separated beams (TSB), 8:24182 (RA:US)
ANTIPROTON BEAMS
Beam Stacking
Stochastic stacking without filters, 8:24194 (R:US)
ANTIPROTON REACTIONS
Absorption
Effects of strong attraction in antiproton-nucleus scattering, 8:24621 (RA:US)
Annihilation
Can exotic phenomena be induced in low energy antiproton-nucleus collisions, 8:24620 (RA:US)
Capture
Theoretical nuclear reaction and structure studies using kaons and photons. Progress report, 1 February 1982-31 January 1983, 8:24641 (R:US)
Elastic Scattering
Can exotic phenomena be induced in low energy antiproton-nucleus collisions, 8:24620 (RA:US)
Particle Production
Can exotic phenomena be induced in low energy antiproton-nucleus collisions, 8:24620 (RA:US)
Scattering
Effects of strong attraction in antiproton-nucleus scattering, 8:24621 (RA:US)
ANTIPROTON-DEUTERON INTERACTIONS
Experiment Planning
Searching for structure in nucleon-antinucleon interactions near threshold, 8:24592 (RA:US)
ANTISERUM
See IMMUNE SERUMS
ANTRIM SHALES
See BLACK SHALES
APARTMENT BUILDINGS
Energy Conservation
Local-government energy-conservation programs and their impact on rental buildings, 8:23704 (R:US)
Solar Space Heating
Solar-energy-system performance evaluation: Montecito Pines apartment complex, Santa Rosa, California, November 1978-March 1979, 8:23335 (R:US)
Solar Water Heating
Solar-energy-system performance evaluation: Montecito Pines apartment complex, Santa Rosa, California, November 1978-March 1979, 8:23335 (R:US)
APPALACHIA
The mountainous region, including valleys and plateaus extending through the eastern USA from New England to Georgia and Alabama.
Black Shales
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Analysis of the Devonian shales in the Appalachian Basin. Volume II. Appendices, 8:23058 (R:US)
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R:US)
Natural Gas Deposits
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R:US)
APPARATUS
See EQUIPMENT
APPENDIX (VERMIFORM)
See LARGE INTESTINE
AQUACULTURE
Energy from marine biomass: methane production by mariculture on land. Final report, 8:23272 (R:US)
AQUATIC ORGANISMS
Unspecified biota characteristic of aquatic ecosystems.
See also AMPHIBIANS
CETACEANS
CRUSTACEANS
FISHES
Biological Stress
Types of potential effects of offshore oil and gas development on marine mammals and endangered species of the northern Bering Sea and Arctic Ocean. Technical paper no. 9 (final), 8:24290 (R:US)
Entrainment
Advanced intake technology for cooling-water intakes: current status and future direction, 8:23409 (R:US)

Metabolism
Multiphasic kinetics for D-glucose uptake by assemblages of natural marine bacteria, 8:24273 (J:DE)

AQUICULTURE
See AQUACULTURE

AQUIFERS
Radiochemical Analysis
Distribution of ^{226}Ra in the lower paleozoic aquifers of southeast Kansas and adjacent areas, 8:24297 (J:US)
Radioactivity in groundwater associated with uranium and phosphate mining and processing, 8:24298 (J:US)

ARC FURNACES
Burners
Oxy-fuel burner development program. Final report Jul 81-May 82, 8:24154 (R:US)

ARGON
Ion-Atom Collisions
Charge distributions of recoil ions, 8:24537 (RA:DE:In German)
L-shell excitation of Si and Ar in collisions of 35 to 400 keV Si^+ on Ar, 8:24540 (RA:DE:In German)
Photoionization
Resonance ionization spectroscopy schemes for Ar, Kr and Xe, 8:24559 (J:NL)

ARGON 36 REACTIONS
Deep Inelastic Heavy Ion Reactions
Charge equilibration in the deep-inelastic reactions $^{40}Ar + {}^{100}Mo$ and $^{36}Ar + {}^{92}Mo$, 8:24675 (RA:DE:In German)
Indication of preequilibrium emission in deep inelastic Ar + Au collisions, 8:24695 (RA:DE:In German)

ARGON 40 REACTIONS
Deep Inelastic Heavy Ion Reactions
Charge equilibration in the deep-inelastic reactions $^{40}Ar + {}^{100}Mo$ and $^{36}Ar + {}^{92}Mo$, 8:24675 (RA:DE:In German)
Heavy Ion Reactions
Global increase of near- and below-barrier fusion for heavier systems, 8:24664 (RA:DE:In German, English)
Measurement of evaporation residues from the system $^{40}Ar + {}^{40}Ca$, 8:24663 (RA:DE:In German, English)
Measurement of neutron multiplicity distributions with scintillator tank, 8:24198 (RA:DE:In German)

ARGON IONS
Collisions
Charge state determination of fast ions in solids using radiative electron capture (REC), 8:24538 (RA:DE:In German)
Ion-Atom Collisions
L-K vacancy sharing in Ar + Kr collisions, 8:24534 (RA:DE:In German)

ARGONNE NATIONAL LABORATORY
See ANL

ARKANSAS POWER-LIGHT-2 REACTOR
See ARKANSAS-2 REACTOR

ARKANSAS-2 REACTOR
Fuel Management
High burnup fuel cycle characteristics of conventional and low leakage fuel management schemes for Arkansas Nuclear One Unit 2, 8:23494 (RA:US)
Fuel Rods
High burnup fuel cycle characteristics of conventional and low leakage fuel management schemes for Arkansas Nuclear One Unit 2, 8:23494 (RA:US)

ARMY PERSONNEL
See MILITARY PERSONNEL

AROMATIC ACIDS
See CARBOXYLIC ACIDS

AROMATIC COMPOUNDS
See AROMATICS

AROMATICS
See also BENZENE
PHENOLS
POLYCYCLIC AROMATIC HYDROCARBONS
TOLUENE
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)

ARSENIC
Ecological Concentration
Role of soil ingestion in the intake of metals by livestock, 8:24474 (J:US)
Environmental Exposure Pathway
Role of soil ingestion in the intake of metals by livestock, 8:24474 (J:US)
Removal
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)

ARTIFICIAL LIFTS
Operating Cost
Costs and indexes for domestic oil- and gas field equipment and production operations, 1982, 8:23017 (R:US)

ASBESTOS
Evaluation
Diallyl phthalate prepolymer characterization and testing in fiberglass filled molding compounds, 8:24019 (R:US)

ASDEX TOKAMAK
Circuit Breakers
4000 shots with the ASDEX ohmic heating breaker, 8:25064 (J:US)
Data Acquisition Systems
Data collection system for a tokamak fusion experiment, 8:25169 (J:US)
Divertors
Divertor efficiency in ASDEX, 8:24863 (J:NL)
Feedback
Plasma control techniques of the ASDEX feedback system, 8:25167 (J:US)
Joule Heating
4000 shots with the ASDEX ohmic heating breaker, 8:25064 (J:US)
Limiters
Test of a toroidal large area limiter in the ASDEX tokamak, 8:24859 (J:NL)
Neutral Beam Sources
Damping elements in the high-voltage circuits of the ASDEX neutral injectors, 8:25089 (J:US)
Development, fabrication and tests of the periplasmatron ion sources for ASDEX, 8:25088 (J:US)
Performance of the ASDEX neutral beam injector, 8:25082 (J:US)
Operation
Operational experience with the ASDEX divertor tokamak, 8:24943 (J:US)
Plasma Diagnostics
Time-resolved measurements of hydrogen and deuterium fluxes in the ASDEX plasma boundary, 8:24775 (R:US)
Power Supplies
Damping elements in the high-voltage circuits of the ASDEX neutral injectors, 8:25089 (J:US)

ASHES
See also FLY ASH
Agglomeration
Review of low-rank-coal AFBC testing, 8:22996 (R:US)
Chemical Analysis
Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center, 8:23085 (R:US)
Chemical Composition
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R:US)
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VIII. Coal quality analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23236 (R:US)

Review of low-rank-coal AFBC testing, 8:22996 (R:US)
Chemical Properties
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Corrosive Effects
Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA:US)
Deposition
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R:US)
Leachates
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R:IT)
Leaching
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Particle Size
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R:US)
Physical Properties
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Sorptive Properties
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R:IT)

ASPHALTENES
Precipitation
Fractionations of non-porphyrin complexes of vanadium and nickel from Boscan crude oil, 8:24047 (R:US)
Recovery
Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R:US)

ASPHALTS
See also ASPHALTENES
Ion Exchange
Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R:US)
Permeability
Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R:US)
Temperature Effects
Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R:US)
Toxicity
Roofing asphalts, pitch and UVL carcinogenesis, 8:24453 (R:US)

ASSETS
See FINANCIAL DATA

ASSIGNMENTS
See ALLOCATIONS

ASTRONAUTS
Anoxia
Effect of radioprotective agents on reactivity to space flight factors, 8:24343 (R:US)
Radioprotective Substances
Effect of radioprotective agents on reactivity to space flight factors, 8:24343 (R:US)

ATMOSPHERIC EXPOSURE CHAMBERS
See EXPOSURE CHAMBERS

ATMOSPHERIC PRECIPITATIONS
Monthly Variations
Analysis of throughfall data and comparison of throughfall sampling procedures, 8:24236 (RA:US)
Quantitative Chemical Analysis
Analysis of throughfall data and comparison of throughfall sampling procedures, 8:24236 (RA:US)
Sampling
Analysis of throughfall data and comparison of throughfall sampling procedures, 8:24236 (RA:US)
Seasonal Variations
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)

ATOM-ATOM COLLISIONS
Deformation
Molecular dipole deformation as a collective variable in slow atomic collisions, 8:24532 (RA:DE:In German)

ATOMIC BOMBS
See NUCLEAR WEAPONS

ATOMIC EXPLOSIONS
See NUCLEAR EXPLOSIONS

ATOMIC FLUORESCENCE SPECTROSCOPY
See FLUORESCENCE SPECTROSCOPY

ATOMIC WEAPONS
See NUCLEAR WEAPONS

ATOM-MOLECULE COLLISIONS
Chemical Reactions
Multichannel distorted wave Born approximation for reactive scattering, 8:24549 (J:US)
Cross Sections
ABCD; atom-triatom nonreactive collisions (CDC7600,CYBER175; FORTRAN IV), 8:24511 (R:US)
ABCRR;ABCRRJ; A+BC classical trajectory study (CDC7600,CYBER175; FORTRAN IV), 8:24512 (R:US)
DWBA
Multichannel distorted wave Born approximation for reactive scattering, 8:24549 (J:US)
S Matrix
VIVAS2; A-BC exact coupled channel scattering (DEC VAX11/780; FORTRAN 77), 8:24513 (R:US)

ATOMS
Affinity
Electron affinities of atoms, molecules, and radicals, 8:24525 (R:US)
Interaction of slow electrons with high-pressure gases ('Quasi-liquids'): synthesis of our knowledge on slow electron-molecule interactions. Progress report, 8:24526 (R:US)
Depth Dose Distributions
COREL;RASE4;DAMG2; ion implantation deposition (CDC6600,7600; FORTRAN IV. The programs, originally written for the FUN compiler, were translated by the NESC for compilation under FTN.), 8:24718 (R:US)
Electron Attachment
Interaction of slow electrons with high-pressure gases ('Quasi-liquids'): synthesis of our knowledge on slow electron-molecule interactions. Progress report, 8:24526 (R:US)
Energy Levels
Electron affinities of atoms, molecules, and radicals, 8:24525 (R:US)
Range
COREL;RASE4;DAMG2; ion implantation deposition (CDC6600,7600; FORTRAN IV. The programs, originally written for the FUN compiler, were translated by the NESC for compilation under FTN.), 8:24718 (R:US)

ATTACHED GREENHOUSES
Performance
Solar-energy-system performance evaluation: Hullco Construction Company single-family residence, Prescott, Arizona, May 1978-April 1979, 8:23334 (R:US)

AUSTENITIC STEELS
Prior to February, 1978 STEELS and AUSTENITE were used to index this concept.
Crack Propagation
Environmental variables and stress corrosion crack propagation rates, 8:23908 (RA:US)
Stress Corrosion
Environmental variables and stress corrosion crack propagation rates, 8:23908 (RA:US)

AUTORADIOGRAPHS
See IMAGES

B

BACILLUS SUBTILIS
Genetic Radiation Effects
Genetics of repair of radiation damage to DNA in bacteria, 8:24381 (RA:US)

BACKFILLING
Materials Testing
Experimental investigation of sodium bentonite stability in Hanford basalt, 8:23174 (R:US)

BACTERIA
See also ESCHERICHIA COLI
Cultivation Techniques
Organisms and compounds of unnatural isotopic composition in NMR, 8:24348 (R:US)
Genetic Radiation Effects
Genetic effects of the decay of radionuclides in cells, 8:24396 (TG:US)
Metabolism
Origins of dissolved organic matter in Southern California coastal waters: experiments on the role of zooplankton, 8:24272 (J:DE)
Population Dynamics
Allochthonous litter decomposition in three Adirondack lakes, 8:24284 (RA:US)
Size
Influence of method on the apparent size distribution of bacterioplankton cells: epifluorescence microscopy compared to scanning electron microscopy, 8:24350 (J:DE)
Volume
Influence of method on the apparent size distribution of bacterioplankton cells: epifluorescence microscopy compared to scanning electron microscopy, 8:24350 (J:DE)
BACTERIOPHAGES
DNA Replication
Correlation of structure and functions of proteins involved in phage T5 DNA replication: an approach to study of mutagenesis, 8:24314 (RA:US)
Genetic Radiation Effects
Genetic effects of the decay of radionuclides in cells, 8:24396 (TG:US)
Mutagenesis
Mechanisms of mutagenesis and DNA repair, 8:24311 (RA:US)
BAER WALLS
See DRUM WALLS
BAG MODEL
Three strange quark system, 8:24614 (RA:US)
BAGHOUSES
Performance
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
Research Programs
Advanced environmental control technology , 8:22952 (R:US)
BAND THEORY
Band model for d- and f-metals, 8:23946 (R:US)
BANKS
See COMMERCIAL BUILDINGS
BARIUM NITRATES
Neutron Diffraction
Temperature dependence of the nuclear positions and spontaneous polarization in pyroelectric $Ba(NO_3)_2xH_2O$, 8:24040 (J:US)
Polarization
Temperature dependence of the nuclear positions and spontaneous polarization in pyroelectric $Ba(NO_3)_2xH_2O$, 8:24040 (J:US)
BARSTOW SOLAR PILOT PLANT
10-MW solar central receiver pilot plant at Barstow, California.
Central Receivers
10-MWe solar-thermal central-receiver pilot plant: receiver cold-flow (Test 1010) and receiver steam-generation (Test 1030) test report, 8:23305 (R:US)
Program Management
Management of the ten-megawatt solar-thermal central-receiver pilot-plant project, 8:23302 (R:US)
Thermal Energy Storage Equipment
Solar Pilot Plant Phase I, detailed design report: thermal storage subsystem research experiment. CDRL Item No. 8 (Approved), 8:23303 (R:US)
BARYON NUMBER 2 RESONANCES
See DIBARYON RESONANCES
BARYON RESONANCES
See also DIBARYON RESONANCES
Particle Models
Odd-parity baryons: progress and problems, 8:24609 (RA:US)
Z*Resonances
πN, anti KN, and KN phenomenology, 8:24588 (RA:US)
BASALT
Experimental investigation of sodium bentonite stability in Hanford basalt, 8:23174 (R:US)
Chemical Composition
Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences, 8:24491 (R:US)
Petrology
Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences, 8:24491 (R:US)
Sensible Heat Storage
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R:US)
Thermal Stresses
Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository, 8:23166 (R:US)
Thermodynamic Properties
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R:US)
BASIC
BASIC2 INTERPRETER; minimal basic language (MCS-80,8080-based microcomputers; 8080 Assembly language), 8:25243 (R:US)
BATES LINAC MIT
See MIT BATES LINAC
BATTELLE COLUMBUS LABORATORY
Reactor Safety Experiments
Analysis of the BCL transient ECC bypass test with the TRAC-PD2/MOD1 code, 8:23652 (J:US)
BATTELLE PACIFIC NORTHWEST LABORATORIES
Radioactive Waste Processing
Iodine-fixation studies at the Pacific Northwest Laboratory, 8:23165 (R:US)
BATTERIES (ELECTRIC)
See ELECTRIC BATTERIES
BEAM DUMPS
Design
Design of calorimeter and ion dump for JET neutral injection beam line, 8:25111 (J:US)
BEAM DYNAMICS
EGUN; calculation of electron trajectories (IBM370,303x,3081; FORTRAN IV (99%) and Assembler (1%)), 8:24167 (R:US)
BEAM MONITORS
Cherenkov Radiation
Cherenkov light as a current-density diagnostic for large-area, repetitively pulsed electron beams, 8:24186 (R:US)
BEAM STRIPPERS
Electrostatic Lenses
Terminal lens for an FN tandem, 8:24159 (R:US)
BEAM TRANSPORT
Charge Exchange
Construction of an apparatus for charge exchange, 8:24179 (RA:DE:In German)
Computer Codes
TRANSPORT; design of charged particle beams (IBM370; FORTRAN IV), 8:24165 (R:US)
BEAM-FOIL SPECTROSCOPY
See ION SPECTROSCOPY
BEAM-GAS SPECTROSCOPY
See ION SPECTROSCOPY
BEAM-PLASMA SYSTEMS
Drift Instability
Measurement of growth rate of plasma drift wave excited by slow electrons, 8:24787 (J:US)
Instability Growth Rates
Measurement of growth rate of plasma drift wave excited by slow electrons, 8:24787 (J:US)
BELLOWS
Fatigue
Fatigue testing of TFTR vacuum vessel bellows, 8:25160 (J:US)
BENTONITE
Stability
Experimental investigation of sodium bentonite stability in Hanford basalt, 8:23174 (R:US)

BENZENE
Configuration Interaction
Symmetry simplifications of space types in configuration interaction induced by orbital degeneracy, 8:24563 (J:US)
Neutron Diffraction
Measurements of inelastic scattering of eV neutrons. Final report, 8:24728 (R:US)
Pyrolysis
Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels. Progress report, February 16, 1982-February 15, 1983, 8:24082 (R:US)
Solvent Properties
Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R:US)
BENZOPYRENE
Biological Effects
Environmental insults to DNA, 8:24413 (RA:US)
Induction and progression of neoplasia in tracheal epithelium, 8:24443 (RA:US)
Mutagen Screening
Mammalian cell genetic toxicology, 8:24416 (RA:US)
Skin Absorption
Dermal Pathology Program, 8:24446 (RA:US)
Toxicity
Dermal Pathology Program, 8:24446 (RA:US)
BERKELEY SUPERHILAC
See SUPERHILAC
BERYLLIA
See BERYLLIUM OXIDES
BERYLLIUM
Genetic Effects
Regulation of gene expression, 8:24449 (RA:US)
Removal
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
BERYLLIUM 7
E2-Transitions
Microscopic calculations of the transition probability and E2 form factor of ^{7}Li and ^{7}Be, 8:24646 (RA:DE:In German, English)
BERYLLIUM MODERATORS
See BERYLLIUM
BERYLLIUM OXIDES
Thermal Conductivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
Thermal Diffusivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
BETA BEAMS (ELECTRONS)
See ELECTRON BEAMS
BETA DECAY RADIOISOTOPES
Q-Value
Prediction of mass excess, β-decay energy and neutron separation energy from the atomic mass formula with empirical shell terms, 8:24643 (R:JP)
BETATRONS
Instability
Orbital stability of the high-current betatron, 8:24190 (J:US)
BIKINI
Radioecology
Comparative behavior of plutonium and americium in the equatorial Pacific, 8:24295 (R:US)
BINARY MIXTURES
Stability
Thermal stability data of amorphous binary alloys, 8:23988 (J:US)
Temperature Effects
Thermal stability data of amorphous binary alloys, 8:23988 (J:US)
BIOCONVERSION
See also ANAEROBIC DIGESTION
1981 Winter Meeting - American Society of Agricultural Engineers, 8:23868 (J:US)
BIOGAS PROCESS
Appropriate technologies for basic energy needs in rural India. Working paper, 8:23759 (R:US)
BIOLOGICAL REACTORS
See BIOREACTORS
BIOMASS
1981 Winter Meeting - American Society of Agricultural Engineers, 8:23868 (J:US)
Gasification
Thermochemical conversion of biomass to synthetic fuels in a large experimental facility. Gasification Research on Wood (GROW) Project, April 1981-March 1982, 8:23270 (R:US)
Liquefaction
Hydrodeoxygenation of phenolic components of wood-derived oil, 8:23279 (R:US)
Program Management
Performance accountability in the biomass energy systems program, 8:23254 (R:US)
BIOMASS CONVERSION PLANTS
Use only for plants converting biomass to fuel, do NOT use for plants preparing wastes and biomass for combustion.
Operation
Review and evaluation of a bioconversion-process demonstration plant and its related technologies, 8:23874 (R:US)
BIOMASS PLANTATIONS
Environmental Impacts
Physical engineering and environmental aspects of ocean kelp farming. Final report, January 1982-September 1982, 8:23257 (R:US)
Seaweeds
Appendix: ocean engineering aspects of coastal kelp farming, 8:23258 (RA:US)
Physical engineering and environmental aspects of ocean kelp farming. Final report, January 1982-September 1982, 8:23257 (R:US)
Wave Forces
Appendix: ocean engineering aspects of coastal kelp farming, 8:23258 (RA:US)
BIOMEDICAL RADIOGRAPHY
See also INDUSTRIAL RADIOGRAPHY.
X-Ray Equipment
Facility for radiographic diagnosis, 8:24346 (P:DE:In German)
BIOREACTORS
Prior to March 1983 this concept was indexed to CHEMICAL REACTORS.
Waste Water
Energy recovery from the effluent of plants anaerobically digesting urban solid waste, 8:23876 (R:US)
BIPYRIDINES
Photolysis
Electron-transfer reactions of chlorophyll a and porphyrin triplets with radicals in aqueous micellar solutions, 8:23283 (J:US)
BIRCHES
Contamination
Oil persistence in tundra and its impact on the below-ground ecosystem. Final report, 8:23039 (R:US)
Ecological Concentration
Oil persistence in tundra and its impact on the below-ground ecosystem. Final report, 8:23039 (R:US)
BISMUTH 209 TARGET
Fission
Fission fragment angular correlation in 300 MeV ^{20}Ne induced reactions on heavy targets, 8:24686 (RA:DE:In German, English)
BISMUTH ALLOYS
Melting
Liquid Li-Pb-Bi, a new tritium breeder, 8:24958 (J:US)
BITTER SPAR
See DOLOMITE
BITUMINOUS COAL
Devolatilization
Project study gas, tar and oil production by devolatilization of power station coal, 8:22913 (R:DE:In German)

Microhardness
The effect of oxidation on the microhardness and plastic properties of Guasare coal, 8:22942 (R:MX:In Spanish)
Oxidation
The effect of oxidation on the microhardness and plastic properties of Guasare coal, 8:22942 (R:MX:In Spanish)
Plasticity
The effect of oxidation on the microhardness and plastic properties of Guasare coal, 8:22942 (R:MX:In Spanish)
Pyrolysis
An overview of coal liquefaction, processes with special reference to the pyrolysis of eastern Canadian coals, 8:22907 (RA:CA)
Application of pyrolysis technology to the utilization of eastern Canadian coals, 8:22900 (R:CA)
Coal pyrolysis by hot dolomitic solids from a fluidized bed combustor, 8:22902 (RA:CA)
Results of the IEA pyrolysis project at Bergbau-Forschung, 8:22904 (RA:CA)

BLACK AMERICANS
Fuel Consumption
Residential fuel comparison patterns for poor, black, and elderly households: a comparative study. Vol I. Data base development, 8:23793 (R:US)

BLACK COAL
See also BITUMINOUS COAL
Coal Preparation
Research on the fundamentals of process control in hard coal preparation, 8:22982 (R:DE:In German)

BLACK HOLES
Electrodynamics
Penrose process of energy extraction in electrodyamics, 8:24504 (R:XA)

BLACK SHALES
Bibliographies
Bibliography of Upper Devonian-Shale sequence, 8:23074 (R:US)
Explosive Fracturing
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R:US)
Evaluation of stimulation technologies in the Eastern Gas Shales Project, 8:23073 (R:US)
High-energy gas-fracturing development. Quarterly report, October-December 1982, 8:23077 (R:US)
Flow Models
Modeling of Devonian shale gas reservoirs. Task 16. Mathematical modeling of shale gas production (2D model). Final report, 8:23053 (R:US)
Fracture Properties
Analysis of the Devonian shales in the Appalachian Basin. Volume II. Appendices, 8:23058 (R:US)
Fractures
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Gas Yields
Analysis of the Devonian shales in the Appalachian Basin. Volume II. Appendices, 8:23058 (R:US)
Geochemistry
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Hydraulic Fracturing
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R:US)
Evaluation of stimulation technologies in the Eastern Gas Shales Project, 8:23073 (R:US)
Information Systems
Eastern Gas Shales Project (EGSP) data files: a final report. Open-file report 81-598, 8:23051 (R:US)
Lithology
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Organic Matter
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980 (Formation-density wire logs), 8:23062 (R:US)
Porosity
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
Radioactivity
Analysis of the Devonian shales in the Appalachian Basin. Volume II. Appendices, 8:23058 (R:US)
Reservoir Engineering
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
Resource Assessment
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R:US)
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
Seismic Surveys
Project to test for shale gas in Ohio. Final report, 8:23054 (R:US)
Stratigraphy
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Analysis of the Devonian shales in the Appalachian Basin. Volume II. Appendices, 8:23058 (R:US)
Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report, 8:23056 (R:US)
Well Logging
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980 (Formation-density wire logs), 8:23062 (R:US)

BLADES (TURBINES)
See TURBINE BLADES

BLANKETS (BREEDING)
See BREEDING BLANKETS

BLASTING
See EXPLOSIVE FRACTURING

BLEOMYCIN
Toxicity
Systemic toxicology, 8:24442 (RA:US)

BLOOD VESSELS
Biomedical Radiography
Facility for radiographic diagnosis, 8:24346 (P:DE:In German)

BNL
Birds
1982 breeding bird censuses and summary of 1977-1982 results, 8:24266 (R:US)

BOILER FUEL
See BOILER FUELS

BOILER FUELS
Efficiency
Shoreside boiler demonstration of fuel-water emulsions. Final report Mar 80-Aug 82, 8:23047 (R:US)
Fuel Substitution
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R:US)
Shoreside boiler demonstration of fuel-water emulsions. Final report Mar 80-Aug 82, 8:23047 (R:US)

BOILERS
Design
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Economic Analysis
Modeling industrial-boiler retirement economics, 8:23696 (R:US)
Efficiency
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R:US)

Fouling
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R:US)
Fuel Substitution
Converting small industrial boilers to burn wood fuels. Forest Service research paper (final), 8:24153 (R:US)
Heat Transfer
Heat transfer in slagging MHD radiant boilers, 8:23770 (R:US)
Heaters
Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA:US)
Materials
Microstructural degradation in boiler steels (SA210A1, SA209T1, SA213-T11, SA213-T22, SA213-321, SA213-347), 8:23928 (RA:US)
Retrofitting
Fluidized bed retrofit study of CE-VUX type boiler at the Jamestown Board of Public Utilities, Carlson Station, Jamestown, New York, 8:23424 (R:US)
Stress Corrosion
Slow strain rate stress corrosion testing of boiler construction materials in synthetic flue gas at elevated temperatures, 8:23910 (RA:US)
Wood Fuels
Converting small industrial boilers to burn wood fuels. Forest Service research paper (final), 8:24153 (R:US)

BOILING WATER COOLED AND MODERATED REACTO
See BWR TYPE REACTORS

BONES
See SKELETON

BOOM TOWNS
Commercial Sector
Patterns of change in the business community of energy boomtowns, 8:23698 (R:US)
Economic Impact
Overview of boom towns and construction efficiency interactions, 8:23697 (R:US)

BORON
Nuclear Reaction Analysis
Analytical applications of neutron capture gamma-ray spectroscopy, 8:24049 (R:DE)

BORON 11
Spin-Lattice Relaxation
^{11}B study of spin dynamics in Y/sub 1-x/RE/sub x/Rh_4B_4 (RE = Gd, Er), 8:23999 (R:US)

BORON ALLOYS
Crystallization
Stem observation of crystallization in thin films of amorphous Fe/sub 40/Ni/sub 40/P/sub 14/B/sub 6/, 8:23984 (J:US)
Phase Studies
Stem observation of crystallization in thin films of amorphous Fe/sub 40/Ni/sub 40/P/sub 14/B/sub 6/, 8:23984 (J:US)

BOROSILICATE GLASS
Additives
Effect of fining agents on the solarization of a borosilicate glass, 8:23355 (J:US)
Corrosion Resistance
Interaction of vitrified high level waste with clay environment, 8:23141 (RA:DE)
Crystallization
Compared quantitative determination of nuclear waste glass crystallization rate by light microscopy and X-ray diffraction, 8:23132 (RA:DE)
Evaluation
Capacity of the borosilicate glass VG 98/12 for components of the high-level radioactive waste, 8:23130 (RA:DE:In German)
Leaching
Critical review of radiation effects on borosilicate glasses, 8:24004 (RA:DE)
Quality Assurance
Using process instrumentation to obviate destructive examination of canisters of HLW glass, 8:23169 (R:US)
Radiation Effects
Critical review of radiation effects on borosilicate glasses, 8:24004 (RA:DE)
Testing
Effect of fining agents on the solarization of a borosilicate glass, 8:23355 (J:US)

BOROSILICATES
See BOROSILICATE GLASS

BOUNDARY LAYERS
Incompressible Flow
Application of the method of integral relations to the calculation of two-dimensional incompressible turbulent boundary layer, 8:24140 (J:US)
Turbulent Flow
Application of the method of integral relations to the calculation of two-dimensional incompressible turbulent boundary layer, 8:24140 (J:US)

BRAIN
Metabolism
Effects of electromagnetic radiation on calcium in the brain. Technical report, 8:24477 (R:US)

BRASS
See also BRASS-ALPHA
Crack Propagation
Environmental variables and stress corrosion crack propagation rates, 8:23908 (RA:US)
Stress Corrosion
Environmental variables and stress corrosion crack propagation rates, 8:23908 (RA:US)

BRASS-ALPHA
Chemical Composition
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
Stress Corrosion
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)

BREAKERS (CIRCUIT)
See CIRCUIT BREAKERS

BREAKUP REACTIONS
Computerized Simulation
Monte-Carlo-simulation of particle decay following binary nuclear reactions, 8:24714 (RA:DE:In German, English)

BREASTS
See MAMMARY GLANDS

BREEDING
Fuel breeding only. See also ANIMAL BREEDING and PLANT BREEDING.
Separation Processes
Analysis of the separation of protium from blanket tritium-product streams, 8:24825 (R:US)

BREEDING BLANKETS
Low activation blanket for the moving ring field-reversed mirror reactor, 8:24978 (J:US)
TRACT reactor blanket study (Triggered-reconnection, compact, toroid), 8:24977 (J:US)
Design
Conceptual design of tritium breeding blanket for INTOR, 8:24956 (J:US)
Design of a lithium blanket module for testing in the TFTR, 8:24980 (J:US)
Elmo Bumpy Torus-reactor first wall/blanket shield (FWBS) design, 8:24972 (J:US)
Helium-cooled, solid breeder blanket design for a tokamak fusion reactor, 8:24981 (J:US)
Low tritium inventory, phase change blanket concept for magnetic fusion, 8:24973 (J:US)
Neutronic design for the TFTR lithium blanket module, 8:24975 (J:US)
Neutronic analysis of graphite-moderated solid breeder design for INTOR, 8:24824 (R:US)
Neutronics analysis of graphite-moderated solid breeder blanket designs for INTOR, 8:24957 (J:US)

Nuclear design of Heliotron fusion reactor blankets (II), 8:24974 (J:US)
Preconceptual design of a packed fluidized bed blanket for a fission suppressed thorium-fueled CTHR, 8:24976 (J:US)
Electromagnetic Radiation
FELIX: an experimental facility to study electromagnetic effects for first wall, blanket, and shield systems, 8:24970 (J:US)
Heat Transfer
Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets, 8:24841 (R:US)
Materials Testing
Liquid Li-Pb-Bi, a new tritium breeder, 8:24958 (J:US)
Solid oxide compounds - properties necessary for fusion applications, 8:24959 (J:US)
Packed Bed
Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets, 8:24840 (R:US)
Test Facilities
FELIX: an experimental facility to study electromagnetic effects for first wall, blanket, and shield systems, 8:24970 (J:US)
The FELIX experimental program and future upgrades, 8:24971 (J:US)
Tritium Recovery
In-situ tritium recovery from Li/sub 17/Pb/sub 83/ breeding blanket, 8:25127 (J:US)

BREMSSTRAHLUNG (MAGNETIC)
See SYNCHROTRON RADIATION

BRINES
Water Treatment
Improving the injectability of high salinity brine for disposal or waterfloodings operations, 8:23027 (J:US)

BROMIDES
See also POTASSIUM BROMIDES
SODIUM BROMIDES
THORIUM BROMIDES
Isotachophoresis
Isotachophoresis, 8:24050 (R:US)

BROMINE IONS
Ion-Atom Collisions
Target thickness and density effects for inner shell excitation in near symmetric collision-systems, 8:24544 (RA:DE:In German)

BRONCHOGENIC CARCINOMA
See CARCINOMAS

BROOKHAVEN AGS
Antinucleon Beams
Antinucleon time separated beams (TSB), 8:24182 (RA:US)
Proton Beams
Brookhaven: preparing for polarized protons, 8:24170 (J:XC)

BROOKHAVEN NATIONAL LABORATORY
See BNL

BUBBLES
Size
Conductivity probe and data acquisition for a liquefaction cold model, 8:22926 (R:US)
Velocity
Conductivity probe and data acquisition for a liquefaction cold model, 8:22926 (R:US)

BUCKLING (STRUCTURAL)
See DEFORMATION

BUILDING (CONSTRUCTING)
See CONSTRUCTION

BUILDINGS
See also COMMERCIAL BUILDINGS
GREENHOUSES
HOSPITALS
OFFICE BUILDINGS
PREFABRICATED BUILDINGS
PUBLIC BUILDINGS
RESIDENTIAL BUILDINGS
SCHOOL BUILDINGS
Air Conditioning
Thermal room models for control analysis, 8:23835 (J:US)
Air Flow
Wind-tunnel research of flowfields within naturally ventilated rooms of simple geometry, 8:23816 (R:US)
Air Pollution Control
Odor control through ventilation: smoking vs. nonsmoking occupancy. Paper 81.22.5, 8:23830 (J:US)
Computer Codes
Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982, 8:23804 (R:US)
Computerized Simulation
Thermal network solution of the DEROB program, 8:23805 (RA:US)
Energy Analysis
Analytical developments in interzone and system coupling methodology, 8:23837 (J:US)
Energy Conservation
BECOM-BNL; buildings energy optimization model (CDC7600; PDS), 8:23795 (R:US)
Energy Consumption
Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982, 8:23804 (R:US)
DOE2.1A; building energy consumption analysis (CDC7600,6600,CYBER175;IBM370,303x;DEC10,20; FORTRAN (99.9%) and COMPASS (0.1%) for the CDC version. The IBM and DEC versions are all FORTRAN.), 8:23794 (R:US)
Heat Transfer
Heat transfer in building thermal insulation: the thickness effect, 8:23834 (J:US)
Lighting Systems
Theory of the geometric algorithm of the DEROB program, 8:23806 (RA:US)
Solar Heating Systems
Comparative report of solar heating system performance, 8:23349 (J:US)
Space Heating
Heat energy consumption and intermittent heating, 8:23800 (R:DE:In German)
Thermal room models for control analysis, 8:23835 (J:US)
Thermal Insulation
Heat transfer in building thermal insulation: the thickness effect, 8:23834 (J:US)
Ventilation
Odor control through ventilation: smoking vs. nonsmoking occupancy. Paper 81.22.5, 8:23830 (J:US)
Outline of a ventilation computer model for possible incorporation into DEROB, 8:23808 (RA:US)
Tobacco smoke in occupied spaces: ventilation requirements. Paper 81.22.4, 8:23831 (J:US)
Wind data for building ventilation in selected US cities, 8:23828 (R:US)
Wind-tunnel research of flowfields within naturally ventilated rooms of simple geometry, 8:23816 (R:US)

BUILDINGS (CONTAINMENT)
See CONTAINMENT BUILDINGS

BURNABLE POISONS
Performance Testing
Burnable poisons for extended burnup fuel management: present and future (PWR), 8:23492 (RA:US)
Fuel management schemes for PWR extended burnup fuel cycles with gadolinium, 8:23493 (RA:US)

BURNER FUEL OIL
See HEATING OILS

BURNERS
Design
Multi-fuel low-NO/sub x/ burner development, Phase II. Final report Mar 79-Feb 82, 8:24152 (R:US)
Oxy-fuel burner development program. Final report Jul 81-May 82, 8:24154 (R:US)
Nozzles
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R:US)
Performance Testing
Oxy-fuel burner development program. Final report Jul 81-May 82, 8:24154 (R:US)
Wear
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R:US)

BURNUP
Burnup
Operating experience with combustion engineering fuel at high burnups (PWR), 8:23474 (RA:US)
Performance Testing
Operating experience with combustion engineering fuel at high burnups (PWR), 8:23474 (RA:US)
BURST CAN DETECTION
See FAILED ELEMENT DETECTION
BURST REACTORS
See PULSED REACTORS
BURST SLUG DETECTION
See FAILED ELEMENT DETECTION
BUTADIENE
Configuration Interaction
Symmetry simplifications of space types in configuration interaction induced by orbital degeneracy, 8:24563 (J:US)
BWR TYPE REACTORS
See also DRESDEN-2 REACTOR
MILLSTONE-1 REACTOR
Computer Graphics
Development and evaluation of a graphic display system for BWRs, 8:23571 (J:US)
Containment Buildings
Windfield and trajectory models for tornado-propelled objects. Final report, 8:23614 (R:US)
Fuel Assemblies
Design and development of KWU 18 x 18 PWR and 9 x 9 BWR fuel assemblies and their relevance to burnup increase, 8:23459 (RA:US)
Fuel Cans
Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours, 8:23920 (RA:US)
Study of LWR fuel behavior by well characterized tests. Part I. Inpile measurement of cladding diametral deformation with burnup, 8:23454 (RA:US)
Fuel Cycle
Economics of extended burnup from a utility point of view, 8:23532 (RA:US)
Extending BWR burnup with spectral shift control, 8:23535 (RA:US)
Impact of extended burnup on the BWR fuel cycle, 8:23534 (RA:US)
Projected national and world benefits to the LWR fuel cycle from extended burnup, 8:23533 (RA:US)
Fuel Management
Economics of extended burnup from a utility point of view, 8:23532 (RA:US)
Fuel Rods
ASEA-ATOM BWR fuel rod experience at high burnup, 8:23452 (RA:US)
BWR high burnup licensing assessment, 8:23461 (RA:US)
Comparison of COMETHE-IIIJ and FCODE-BETA fission gas-release predictions with measurements. Final report, 8:23466 (R:US)
DOE/GE/NSP extended burnup program, 8:23451 (RA:US)
Economics of extended burnup from a utility point of view, 8:23532 (RA:US)
Evaluation of published high burnup fission gas release data, 8:23456 (RA:US)
Extended burnup fuel investigations in commercial reactors, 8:23449 (RA:US)
Extending BWR burnup with spectral shift control, 8:23535 (RA:US)
Fission gas release from fuel rods irradiated in US commercial light water reactors, 8:23457 (RA:US)
High burnup performance of BN fuels in LWR's, 8:23453 (RA:US)
Impact of extended burnup on the BWR fuel cycle, 8:23534 (RA:US)
Irradiation tests on barrier fuel in support of a large-scale demonstration, 8:23460 (RA:US)
KWU experience and analysis of LWR fuel with respect to high burnup, 8:23450 (RA:US)
LWR extended burnup: fuel performance and utilization, 8:23448 (R:US)
LWR extended burnup: fuel performance and utilization, 8:23458 (R:US)
Projected national and world benefits to the LWR fuel cycle from extended burnup, 8:23533 (RA:US)
Regulatory perspective on extended burnup fuel, 8:23522 (RA:US)
Risoe Fission Gas Project: an overview, 8:23462 (RA:US)
Study of LWR fuel behavior by well characterized tests. Part I. Inpile measurement of cladding diametral deformation with burnup, 8:23454 (RA:US)
Study of LWR fuel behavior by well characterized tests. Part II. Post-irradiation examination and its related analysis of TSURUGA fuel, 8:23455 (RA:US)
Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel, 8:23463 (RA:US)
In-Service Inspection
Nondestructive evaluation program: progress in 1982, 8:23464 (R:US)
Legal Aspects
Operating reactors licensing actions summary, 8:23527 (R:US)
Loss of Coolant
BWR refill-reflood program - TRAC-BWR component development, 8:23609 (R:US)
REFLUX; LWR reflood heat transfer prediction (IBM360; FORTRAN IV), 8:23445 (R:US)
Loss of Flow
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
NATBWR: a steady-state model for natural circulation in boiling-water reactors, 8:23612 (R:US)
Reactor Accidents
A model for predicting containment response to hydrogen burns, 8:23654 (J:US)
Reactor Cooling Systems
Liquid level sensing device, 8:23506 (P:US)
Reactor Decommissioning
Funding nuclear-power-plant decommissioning. Final report, 8:23536 (R:US)
Reactor Licensing
BWR high burnup licensing assessment, 8:23461 (RA:US)
Regulatory licensing status summary report, Nuclear power plants data for decisions (blue book), February 1-February 28, 1983, 8:23526 (R:US)
Reactor Materials
Plant Materials Program: progress June 1981-May 1982, 8:23465 (R:US)
Reactor Operation
Licensed operating reactors. Status summary report data as of October 31, 1982, 8:23523 (R:US)
Operating reactors licensing actions summary, 8:23527 (R:US)
Regulatory perspective on extended burnup fuel, 8:23522 (RA:US)
Reactor Safety
Organization and structure of an EPRI DATATRAN data bank, 8:23613 (R:US)
Selected review and evaluation of US safety research vis-a-vis foreign safety research for nuclear power plants, 8:23636 (R:US)
Reactor Shutdown
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
Scram
Analysis of a partial scram event in a typical BWR/4, 8:23653 (J:US)
Spectral Shift Control
Extending BWR burnup with spectral shift control, 8:23535 (RA:US)
Spent Fuel Elements
Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel, 8:23463 (RA:US)
BYRON-1 REACTOR
Control Rooms
Human-factors engineering control-room design review/audit report: Byron Generating Station, Commonwealth Edison Company, 8:23567 (R:US)

Human Factors Engineering
Human-factors engineering control-room design review/audit report: Byron Generating Station, Commonwealth Edison Company, 8:23567 (R:US)
BYRON-2 REACTOR
Control Rooms
Human-factors engineering control-room design review/audit report: Byron Generating Station, Commonwealth Edison Company, 8:23567 (R:US)
Human Factors Engineering
Human-factors engineering control-room design review/audit report: Byron Generating Station, Commonwealth Edison Company, 8:23567 (R:US)

C

CABLES (ELECTRIC)
See ELECTRIC CABLES
CADMIUM
Biological Effects
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Corrosive Effects
Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours, 8:23920 (RA:US)
Ecological Concentration
Accumulation of cadmium and zinc in soil and vegetation from long-term application of wastewater, 8:24475 (J:US)
Cadmium and lead contaminated soils in some British metal mining areas, 8:24260 (J:US)
Environmental pollution control at the AMAX-Homestake lead smelter, 8:24245 (J:US)
Heavy metals in the environs of a smelter, 8:24292 (J:US)
Metabolism
Analytical measurements of selected metals in samples from a human metabolic study, 8:24473 (J:US)
Cadmium-copper interaction: tissue accumulation and subcellular distribution of cadmium in mice after simultaneous administration of cadmium and copper, 8:24471 (J:US)
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Removal
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
Tissue Distribution
Cardiovascular toxicology, 8:24447 (RA:US)
Toxicity
Cardiovascular toxicology, 8:24447 (RA:US)
Enzyme and gene regulation in Drosophila, 8:24412 (RA:US)
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
CADMIUM CHLORIDES
Toxicity
Systemic toxicology, 8:24442 (RA:US)
CADMIUM COMPOUNDS
See also CADMIUM SULFIDES
Genetic Effects
In vivo cytogenetic effect of some salts of the heavy metals cadmium, chromium, mercury, and platinum in assays of micronuclei and sister chromatid exchange, 8:24411 (R:DE:In German)
CADMIUM SULFIDES
Photolysis
Photochemical, photoelectrochemical and photobiological conversion. Final report, 8:23273 (R:US)
CAES
See COMPRESSED AIR ENERGY STORAGE
CAES PLANT
See COMPRESSED AIR STORAGE POWER PLANTS
CALCIUM
Biological Effects
Effect of phosphorus and calcium on zinc metabolism in man, 8:24461 (J:US)
Effect of dietary lead and calcium on tissue lead accumulation and depletion in sheep, 8:24470 (J:US)
Magnetic Susceptibility
Local susceptibility of ^{63}Ni in palladium, 8:23960 (RA:DE:In German)
Metabolism
Effects of electromagnetic radiation on calcium in the brain. Technical report, 8:24477 (R:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
CALCIUM 40 TARGET
Argon 40 Reactions
Measurement of evaporation residues from the system ^{40}Ar + ^{40}Ca, 8:24663 (RA:DE:In German, English)
Carbon 12 Reactions
Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution, 8:24649 (RA:DE:In German)
Neon 20 Reactions
Dissociation of ^{20}Ne in collisions with ^{40}Ca at 14.5 MeV/nucleon, 8:24660 (RA:DE:In German, English)
Incomplete momentum transfer in fusion reactions, 8:24662 (RA:DE:In German)
Study of ^{20}Ne + ^{40}Ca at Esub(lab)/A = 14.5 MeV, 8:24661 (RA:DE:In German, English)
Study of inelastic and single-neutron transfer reactions induced by 14.5 MeV/A ^{20}Ne ions on ^{40}Ca, 8:24659 (RA:DE:In German, English)
CALCIUM 48 TARGET
Carbon 12 Reactions
Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution, 8:24649 (RA:DE:In German)
CALCIUM COMPOUNDS
See also CALCIUM OXIDES
Deposition
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
Washout
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
CALCIUM IONS
Electron-Ion Collisions
Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence, 8:24554 (J:US)
CALCIUM OXIDES
Electronic Structure
XPS study of CaO in sodium silicate glass, 8:24030 (R:US)
Molecular Structure
XPS study of CaO in sodium silicate glass, 8:24030 (R:US)
CALHOUN-1 REACTOR
Fuel Management
Evaluation and demonstration of methods for improved fuel utilization. Sixth semi-annual progress report, April 1, 1982-September 30, 1982, 8:23472 (R:US)
Fuel Pools
Evaluation and demonstration of methods for improved fuel utilization: Fort Calhoun spent-fuel-pool cleanup following a spill of hydraulic fluid containing glycol, 8:23471 (R:US)
Reactor Maintenance
Evaluation and demonstration of methods for improved fuel utilization: Fort Calhoun spent-fuel-pool cleanup following a spill of hydraulic fluid containing glycol, 8:23471 (R:US)
Evaluation and demonstration of methods for improved fuel utilization. Sixth semi-annual progress report, April 1, 1982-September 30, 1982, 8:23472 (R:US)
Reactor Operation
Evaluation and demonstration of methods for improved fuel utilization. Sixth semi-annual progress report, April 1, 1982-September 30, 1982, 8:23472 (R:US)

CALIBRATION STANDARDS
Libraries
Low-energy, photon-emitting nuclides: reference spectra library, 8:24737 (RA:US)
CALIFORNIA
Ground Water
Two-dimensional, steady-state model of ground-water flow, Nevada Test Site and vicinity, Nevada-California, 8:24484 (R:US)
Oil Fields
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R:US)
Petroleum Industry
Petroleum logistics. Final report and summary, 8:23725 (R:US)
Volcanoes
Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences, 8:24491 (R:US)
CALIFORNIUM 252
Spontaneous Fission
Measurement of neutron multiplicity distributions with scintillator tank, 8:24198 (RA:DE:In German)
CALORIMETERS
Fabrication
TFTR neutral beam calorimeter fabrication and instrumentation, 8:25215 (J:US)
CALORIMETERS (PARTICLE)
See SHOWER COUNTERS
CALVERT CLIFFS-1 REACTOR
Fuel Management
Application of extended burnup: a utility perspective, 8:23478 (RA:US)
Fuel Rods
Application of extended burnup: a utility perspective, 8:23478 (RA:US)
CALVERT CLIFFS-2 REACTOR
Fuel Management
Application of extended burnup: a utility perspective, 8:23478 (RA:US)
Fuel Rods
Application of extended burnup: a utility perspective, 8:23478 (RA:US)
CAMAC SYSTEM
Computer Application to Measurement And Control.
Analog Systems
CAMAC analog signal conditioning module, 8:25197 (J:US)
Design
CAMAC timing and sequencing module, 8:25196 (J:US)
CAMP
See AMP
CANADA
Interconnected Power Systems
US-Canadian electricity trade, 8:23740 (R:US)
Oil Sand Industry
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Research Programs
The Canmet research program on coal pyrolysis - application to eastern Canada, 8:22905 (RA:CA)
CANCER
See NEOPLASMS
CANONICAL EQUATIONS
See DIFFERENTIAL EQUATIONS
CAPACITIVE ENERGY STORAGE EQUIPMENT
Electrical Testing
2.0 MVA voltage doubler power supply for capacitor bank charging, 8:25068 (J:US)
CAPSULES
Deformation
Flight-systems safety program, September 1982. Progress report, 8:23202 (R:US)
Impact Tests
Flight-systems safety program, September 1982. Progress report, 8:23202 (R:US)
CARBIDES
See also SILICON CARBIDES
TITANIUM CARBIDES
URANIUM CARBIDES
Optical Properties
Optical properties of solids for solar energy conversion, 8:24006 (R:US)
CARBINOL
See METHANOL
CARBON
See also ACTIVATED CARBON
DIAMONDS
GRAPHITE
Antiproton Reactions
Effects of strong attraction in antiproton-nucleus scattering, 8:24621 (RA:US)
Distribution
Method for uniformly distributing carbon flakes in a positive electrode, the electrode made thereby and compositions, 8:23683 (P:US)
Hypernuclei
Supernuclei, supernuclear matter & SU(4) symmetry, 8:24616 (RA:US)
Ion-Atom Collisions
Target-thickness dependence of K-shell vacancy fractions in foil-excited ion beams, 8:24557 (J:US)
Ion-Molecule Collisions
Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982, 8:24522 (R:US)
Leaching
Effects of simulated acid precipitation on carbon and nitrogen mineralization in soil, 8:24256 (RA:US)
Mineralization
Effects of simulated acid precipitation on carbon and nitrogen mineralization in soil, 8:24256 (RA:US)
CARBON 12 REACTIONS
Breakup Reactions
^{12}C and ^{8}Be production in $^{12}C + ^{200}Pb$ collisions, 8:24701 (J:NL)
Elastic Scattering
Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution, 8:24649 (RA:DE:In German)
Observation of the nuclear rainbow scattering in the $^{12}C + ^{12}C$ system at 300 MeV, 8:24647 (RA:DE:In German)
Heavy Ion Reactions
Global increase of near- and below-barrier fusion for heavier systems, 8:24664 (RA:DE:In German, English)
Inclusive Interactions
Light particle emission from the reaction of ^{12}C with ^{58}Ni and ^{197}Au at 25 MeV per nucleon, 8:24666 (RA:DE:In German, English)
Inelastic Scattering
Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution, 8:24649 (RA:DE:In German)
Observation of the nuclear rainbow scattering in the $^{12}C + ^{12}C$ system at 300 MeV, 8:24647 (RA:DE:In German)
One-Nucleon Transfer Reactions
Spin orbit interaction of ^{12}C and ^{11}B, 8:24692 (RA:DE:In German)
Total Cross Sections
Energy dependence of the total reaction cross section of the system $^{12}C + ^{12}C$, 8:24648 (RA:DE:In German)
CARBON 12 TARGET
Carbon 12 Reactions
Energy dependence of the total reaction cross section of the system $^{12}C + ^{12}C$, 8:24648 (RA:DE:In German)
Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution, 8:24649 (RA:DE:In German)
Observation of the nuclear rainbow scattering in the $^{12}C + ^{12}C$ system at 300 MeV, 8:24647 (RA:DE:In German)
Carbon 13 Reactions
Reaction model for the description of spin-flip in the inelastic scattering of $^{12}C + ^{13}C \rightarrow ^{13}C' + ^{12}C^{*}(2^{+})$, 8:24645 (RA:DE:In German, English)

Kaon Plus Reactions
Uncertainty in the K^+-nucleus interaction below 1 GeV, 8:24618 (RA:US)
Neon 20 Reactions
Incomplete momentum transfer in fusion reactions, 8:24662 (RA:DE:In German)
Pion Plus Reactions
Evidence against clusters in ^{13}C nuclei and against the $^1D_2$ 2140 dibaryon resonance, 8:24650 (RA:US)

CARBON 13 REACTIONS
Charge-Exchange Reactions
Search for giant resonance charge exchange modes using the (^{13}C,^{13}N) reaction, 8:24658 (RA:DE:In German, English)
Inelastic Scattering
Reaction model for the description of spin-flip in the inelastic scattering of $^{13}C + {}^{24}Mg \rightarrow {}^{13}C' + {}^{24}Mg^*(2^+)$, 8:24652 (RA:DE:In German, English)
Reaction model for the description of spin-flip in the inelastic scattering of $^{13}C + {}^{12}C \rightarrow {}^{13}C' + {}^{12}C^*(2^+)$, 8:24645 (RA:DE:In German, English)

CARBON DIOXIDE
Consumption Rates
Computer-assisted system for determination of O_2 consumption and CO_2 production in man. Final report, 8:24399 (R:US)
Greenhouse Effect
Carbon dioxide and climate. A bibliography, 8:24233 (R:US)
Photoionization
Effects of resonances in molecular photoionization measured with triply differential photoelectron spectroscopy, 8:24519 (R:US)
Production
Computer-assisted system for determination of O_2 consumption and CO_2 production in man. Final report, 8:24399 (R:US)

CARBON FLUORIDES
Bond Lengths
A $^4\Sigma^-$—X ^{2}Pi transition in CF: A measurement of the term energy and bond length of a fluoromethylidyne metastable, 8:24548 (J:US)
Emission Spectra
A $^4\Sigma^-$—X ^{2}Pi transition in CF: A measurement of the term energy and bond length of a fluoromethylidyne metastable, 8:24548 (J:US)
Radicals
A $^4\Sigma^-$—X ^{2}Pi transition in CF: A measurement of the term energy and bond length of a fluoromethylidyne metastable, 8:24548 (J:US)

CARBON IONS
Ion-Atom Collisions
Semiclassical trajectory effects on C^{6+}-H charge-exchange cross sections at low energy, 8:24556 (J:US)

CARBON MONOXIDE
Atmospheric Circulation
Research in atmospheric chemistry and transport. Final report, 15 Sep 1978-14 Jan 1982, 8:24238 (R:US)
Methanation
Catalysts and relations of selectivity for the Fischer-Tropsch-Synthesis, 8:22915 (R:DE:In German)
Design and modeling of low-pressure-drop methanation reactors, 8:23218 (R:US)
Pilot-plant study of an adiabatic parallel-plate methanation reactor, 8:23220 (R:US)
Transmission and backscatter Moessbauer spectroscopy of zeolite Fe (and Fe-Co) synfuel catalysts, 8:24057 (R:US)
Oxidation
Synthetic and catalytic studies directed toward homogeneously catalyzed selective oxidation. Final report, 8:24059 (R:US)
Production
Energy storage via the carbothermic reduction of sodium oxide, 8:23667 (R:US)
Seasonal Variations
Research in atmospheric chemistry and transport. Final report, 15 Sep 1978-14 Jan 1982, 8:24238 (R:US)

CARBON STEELS
See also STEEL-ASTM-A533-B
Corrosion
Corrosion problems associated with solar fluid and components, 8:23315 (R:US)
Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA:US)
Plant Materials Program: progress June 1981-May 1982, 8:23465 (R:US)
Corrosion Fatigue
Environmental effects on fatigue crack initiation and early propagation, 8:23907 (RA:US)
Part-through and compact tension corrosion fatigue crack growth behavior of carbon steel in high temperature water (Carbon steel SA 333 grade 6), 8:23902 (RA:US)
Crack Propagation
Environmental effects on fatigue crack initiation and early propagation, 8:23907 (RA:US)
Part-through and compact tension corrosion fatigue crack growth behavior of carbon steel in high temperature water (Carbon steel SA 333 grade 6), 8:23902 (RA:US)
Microstructure
Microstructural degradation in boiler steels (SA210A1, SA209T1, SA213-T11, SA213-T22, SA213-321, SA213-347), 8:23928 (RA:US)
Oxidation
Microstructural degradation in boiler steels (SA210A1, SA209T1, SA213-T11, SA213-T22, SA213-321, SA213-347), 8:23928 (RA:US)
Thermal Conductivity
Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA:US)

CARBONATE ROCKS
See also LIMESTONE
Catagenesis
Deep-burial diagenesis. Annual progress report, 1982-1983, 8:24498 (R:US)
Porosity
Deep-burial diagenesis. Annual progress report, 1982-1983, 8:24498 (R:US)
Recrystallization
Deep-burial diagenesis. Annual progress report, 1982-1983, 8:24498 (R:US)

CARBONYLS
Only for compounds of metals with carbonyl radicals.
Catalytic Effects
Synthetic and catalytic studies directed toward homogeneously catalyzed selective oxidation. Final report, 8:24059 (R:US)
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
Toxicity
Systemic toxicology, 8:24442 (RA:US)

CARBOXYLASE
Specificity
Protein chemistry and enzyme mechanisms, 8:24320 (RA:US)

CARBOXYLIC ACIDS
See also AMINO ACIDS
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)

CARCINOGENESIS
Biological Pathways
Skin carcinogenesis: tumor initiation and promotion, 8:24452 (RA:US)
Genetics
Molecular genetics of carcinogenesis, 8:24387 (RA:US)

CARCINOMAS
Radioinduction
Radiation immunology (X radiation), 8:24386 (RA:US)
Radiation carcinogenesis (Neutrons, ultraviolet radiation), 8:24388 (RA:US)

CARDIOVASCULAR DISEASES
Pathogenesis
Ebb and flow of manganese: a possible pathogenic factor in birth defects, cancer and heart disease, 8:24457 (J:US)

CAROLINA POWER LIGHT ROBINSON-2 REACTOR
See ROBINSON-2 REACTOR
CASINGS
See COVERINGS
CASKS
See also SPENT FUEL CASKS
Design
Sewage Solids Irradiator Transportation System (SSITS) cask: preliminary design description, 8:24113 (R:US)
Specifications
Sewage Solids Irradiator Transportation System (SSITS) cask: preliminary design description, 8:24113 (R:US)
CAST IRON
Sensible Heat Storage
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R:US)
Thermodynamic Properties
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R:US)
CATALYSTS
Chemical Composition
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Chemical Preparation
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Chemical Properties
Yield of the oxidation of very rarefied propane/air mixtures in catalytic fluidized beds, 8:24571 (R:DE:In German)
Comparative Evaluations
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Synthesis of liquids and pipeline gas by Fischer-Tropsch (Taconite + K; iron sheathed taconite; taconite + Cu + K), 8:23221 (R:US)
Deactivation
Pilot-plant study of an adiabatic parallel-plate methanation reactor, 8:23220 (R:US)
Electronic Structure
SCF-X alpha-SW cluster molecular-orbital models of catalysts, alloys, magnetic materials, and superconductors. Interim report, 8:23891 (R:US)
Performance Testing
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R:US)
Research Programs
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Specificity
Transportation fuels from indirect coal liquefaction (US DOE; reviews and considers work in other countries), 8:22918 (R:US)
Structural Chemical Analysis
Transmission and backscatter Moessbauer spectroscopy of zeolite Fe (and Fe-Co) synfuel catalysts, 8:24057 (R:US)
CATALYTIC CRACKING
Catalysts
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
CATHODES
Erosion
Arc velocity and erosion for stainless steel and aluminium cathodes, 8:24886 (J:NL)
Study of the erosion rate of vacuum arcs in a transverse magnetic field, 8:24885 (J:NL)
Porous Materials
20 kW-fuel cell units by compact assembly. Pt. 4, 8:23787 (R:DE:In German)
Testing
Testing of water-cooled cathodes on the Westinghouse high surface heat flux test facility, 8:25216 (J:US)
CE ENTRAINED FUEL PROCESS
Bench-Scale Experiments
Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report, 8:22931 (R:US)
Economic Analysis
Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report, 8:22931 (R:US)
Mathematical Models
Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report, 8:22931 (R:US)
Performance
Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report, 8:22931 (R:US)
Process Development Units
Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report, 8:22931 (R:US)
CELL FLOW SYSTEMS
Uses
Cytometrics, 8:24450 (RA:US)
High resolution DNA content measurements of mammalian sperm, 8:24327 (J:US)
CELL GROWTH (ANIMAL)
See ANIMAL CELLS
CELL GROWTH (PLANT)
See PLANT CELLS
CELL MEMBRANES
Biological Functions
Studies of membrane structure by freeze-etching. Final report, January 1, 1979-December 31, 1982, 8:24325 (R:US)
Molecular Structure
Studies of membrane structure by freeze-etching. Final report, January 1, 1979-December 31, 1982, 8:24325 (R:US)
CELLS (ANIMAL)
See ANIMAL CELLS
CELLS (BACTERIAL)
See BACTERIA
CELLS (ELECTROLYTIC)
See ELECTROLYTIC CELLS
CELLS (PLANT)
See PLANT CELLS
CELLULOSE
Enzymatic Hydrolysis
Energy recovery from the effluent of plants anaerobically digesting urban solid waste, 8:23876 (R:US)
CENTRAL HEATING PLANTS
Fuel Consumption
Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23854 (R:DE:In German)
CENTRAL RECEIVERS
Control
10-MWe solar-thermal central-receiver pilot plant: receiver cold-flow (Test 1010) and receiver steam-generation (Test 1030) test report, 8:23305 (R:US)
Mathematical Models
Thermodynamic model for a central receiver of a solar plant with partial shading of the heliostat field, 8:23300 (R:DE:In German)
Performance Testing
10-MWe solar-thermal central-receiver pilot plant: receiver cold-flow (Test 1010) and receiver steam-generation (Test 1030) test report, 8:23305 (R:US)
CERAMICS
Creep
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
High temperature automated creep testing of ceramic fiber board, 8:24017 (RA:US)

Leaching
Leaching of polyphase nuclear waste ceramics: microstructural and phase characterization, 8:23181 (J:US)
Meetings
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Microstructure
Leaching of polyphase nuclear waste ceramics: microstructural and phase characterization, 8:23181 (J:US)
Physical Radiation Effects
Effects of irradiation on ceramics for fusion-reactor applications, 8:23992 (R:US)

CERIUM
Band Theory
Band model for d- and f-metals, 8:23946 (R:US)
Crystal-Phase Transformations
Photoemission studies of the γ-α phase transition in Ce: Changes in 4f character, 8:23980 (J:US)
Theory of photoemission from metallic Ce, 8:23979 (J:US)
Fermi Level
Band model for d- and f-metals, 8:23946 (R:US)
Photoemission
Photoemission studies of the γ-α phase transition in Ce: Changes in 4f character, 8:23980 (J:US)
Theory of photoemission from metallic Ce, 8:23979 (J:US)

CERIUM 144
Recovery
Technology for recovery of byproducts, 8:23173 (R:US)

CERIUM ALLOYS
Fermi Level
Fermi-surface properties of $CeSn_3$ and related compounds ($LaSn_3$), 8:23947 (R:US)

CERIUM COMPOUNDS
Band Theory
Band model for d- and f-metals, 8:23946 (R:US)
Fermi Level
Band model for d- and f-metals, 8:23946 (R:US)

CERIUM IONS
Nuclear Magnetic Resonance
4f instabilities of isolated Ce ions in elements, 8:23966 (RA:DE:In German, English)
Spin-Lattice Relaxation
4f spin dynamics for isolated mixed valent Ce ions in Th metal, 8:23967 (RA:DE:In German, English)
Concentration and temperature dependence of the 4f spin relaxation of isolated Nd and Ce ions in simple metals, 8:23968 (RA:DE:In German, English)

CERN
Research Programs
Research program at Lear, 8:24591 (RA:US)
Storage Rings
Research program at Lear, 8:24591 (RA:US)

CESIUM
Corrosive Effects
Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours, 8:23920 (RA:US)
Ion-Atom Collisions
Rotationally induced L-shell excitation in energetic Ag + Ag and Ag + Cs collisions, 8:24536 (RA:DE:In German)
Separation Processes
Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository, 8:23166 (R:US)

CESIUM 137
Inventories
Byproduct inventories, 8:23171 (R:US)
Recovery
Technology for recovery of byproducts, 8:23173 (R:US)

CETACEANS
Ecology
Proceedings of a workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of Outer Continental Shelf development, 8:23040 (R:US)
Population Dynamics
Existing programs, technology, and requirements relative to the conservation and protection of marine mammals in the US fishery conservation zone and in the southern ocean, 8:24271 (R:US)
Research Programs
Existing programs, technology, and requirements relative to the conservation and protection of marine mammals in the US fishery conservation zone and in the southern ocean, 8:24271 (R:US)

CFFF
See MHD GENERATOR CFFF

CHALKS
See LIMESTONE

CHANNELS (REACTOR)
See REACTOR CHANNELS

CHARGED PARTICLE DETECTION
Charge-Coupled Devices
Detection of minimum ionizing particles with a charge coupled device, 8:24206 (J:NL)

CHARGED-PARTICLE TRANSPORT
Transport Theory
Linear transport theory and an indefinite Sturm-Liouville problem, 8:24722 (R:US)

CHARGING MACHINES (REACTOR)
See REACTOR CHARGING MACHINES

CHARS
Combustion Properties
Char combustion and utilization, 8:22993 (RA:CA)

CHEMICAL EXPLOSIVES
See also NITROMETHANE
SHAPED CHARGES
TATB
Detonations
Deflagration-to-detonation transition in PETN and HMX, 8:24211 (R:US)
Initiation of propagating detonations, 8:24212 (R:US)
Study of premature explosions in artillery projectiles filled with Composition-B. Final report, 8:24217 (R:US)
Fracture Properties
High-energy propellant studies: introduction and overview, 8:24215 (R:US)
Sensitivity
Deflagration-to-detonation transition in PETN and HMX, 8:24211 (R:US)
Initiation of propagating detonations, 8:24212 (R:US)
Study of premature explosions in artillery projectiles filled with Composition-B. Final report, 8:24217 (R:US)
Stability
High-energy propellant studies: introduction and overview, 8:24215 (R:US)

CHEMICAL FEEDSTOCKS
Production
The pyrolysis of Canadian coals for the production of fuels and petrochemicals, 8:22906 (RA:CA)

CHEMICAL HEAT PUMPS
Hydrogen Storage
Materials engineering of metal hydrides, 8:23216 (R:US)

CHEMICAL MUTAGENS
See MUTAGENS

CHEMICAL PLANTS
See also GASOLINE PLANTS
Cogeneration
Potential for cogeneration in distillation. Final report, 8:23863 (R:US)
Design
Flexibility and resiliency of process systems, 8:23029 (R:US)
General framework for the assessment of dynamic resilience. Part II. An application, 8:23860 (R:US)
General framework for the assessment of dynamic resilience. Part I. Theory, 8:24106 (R:US)
Engineering
Flexibility and resiliency of process systems, 8:23029 (R:US)
Operation
General framework for the assessment of dynamic resilience. Part II. An application, 8:23860 (R:US)
General framework for the assessment of dynamic resilience. Part I. Theory, 8:24106 (R:US)
Process Control
General framework for the assessment of dynamic resilience. Part II. An application, 8:23860 (R:US)

General framework for the assessment of dynamic resilience. Part I. Theory, 8:24106 (R:US)
Waste Product Utilization
Update of the 'development of alternate liquid fuels'. Paper 81.24.7, 8:23867 (J:US)
CHEMICAL REACTION KINETICS
See also COMBUSTION KINETICS
Applications of classical trajectory techniques to reactive scattering, 8:24566 (J:US)
Boltzmann Equation
Reactive quantum Boltzmann equations: A derivation from an arrangement channel space representation and BBGKY hierarchy, 8:24065 (J:US)
Mathematical Models
Reaction-path interpolation models for variational transition state theory, 8:24063 (J:US)
Transport Theory
Reactive quantum Boltzmann equations: A derivation from an arrangement channel space representation and BBGKY hierarchy, 8:24065 (J:US)
CHEMICAL REACTORS
Control Systems
General framework for the assessment of dynamic resilience. Part II. An application, 8:23860 (R:US)
Design
Design and modeling of low-pressure-drop methanation reactors, 8:23218 (R:US)
Mathematical Models
Design and modeling of low-pressure-drop methanation reactors, 8:23218 (R:US)
Multiphase Flow
Conductivity probe and data acquisition for a liquefaction cold model, 8:22926 (R:US)
CHEMICALS
See MUTAGENS
SURFACTANTS
TUMOR PROMOTERS
CHEMISTRY (WATER)
See WATER CHEMISTRY
CHINA
Biomass Conversion Plants
Family and community biogas plants in rural India and China, 8:23222 (R:US)
CHLOR-ALKALI INDUSTRY
See CHLORINE
CHLORIDES
See also CADMIUM CHLORIDES
MERCURY CHLORIDES
POTASSIUM CHLORIDES
SODIUM CHLORIDES
THORIUM CHLORIDES
Deposition
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
Isotachophoresis
Isotachophoresis, 8:24050 (R:US)
Washout
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
CHLORINATED AROMATIC HYDROCARBONS
Removal
Reclamation of transformer oils containing PCBs by the Sunohio PCBX Process. Final report, 8:23038 (R:US)
Toxicity
Polychlorinated dibenzo-p-dioxins: criteria for their effects on man and his environment, 8:22961 (R:CA)
CHLORINE
Chemical Analysis
Fate of chlorine in seawater. Final report, August 1, 1977-January 31, 1981, 8:24268 (R:US)
Chemical Reaction Kinetics
Dynamics of association and decay. A model study of $Cl^- + Cl_2$ arrow-right-left Cl/sup -asterisk/$_2$ using quasiclassical trajectories, 8:24062 (J:US)
Fate of chlorine in seawater. Final report, August 1, 1977-January 31, 1981, 8:24268 (R:US)
Nuclear Reaction Analysis
Analytical applications of neutron capture gamma-ray spectroscopy, 8:24049 (R:DE)
Production
Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, September 15, 1981-November 29, 1982, 8:23264 (R:US)
Removal
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
CHLORINE CHLORIDES
See CHLORINE
CHLORINE IONS
Chemical Reaction Kinetics
Dynamics of association and decay. A model study of $Cl^- + Cl_2$ arrow-right-left Cl/sup -asterisk/$_2$ using quasiclassical trajectories, 8:24062 (J:US)
Energy-Level Transitions
Beam-foil spectroscopy at Argonne National Laboratory, 8:24517 (R:US)
Ion Spectroscopy
Beam-foil spectroscopy at Argonne National Laboratory, 8:24517 (R:US)
CHLOROPHYLL
Photolysis
Electron-transfer reactions of chlorophyll a and porphyrin triplets with radicals in aqueous micellar solutions, 8:23283 (J:US)
CHROMIUM
Electric Conductivity
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R:US)
Getters
Studies of chromium gettering, 8:24903 (J:NL)
Magnetic Properties
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R:US)
Metabolism
Increasing total and biologically active chromium in wheat grain and spinach by spraying with chromium salts, 8:24467 (J:US)
Superconductivity
Superconductivity in Au-Cr-Au and Ag-Pd-Ag epitaxial metal film sandwiches, 8:23944 (R:US)
CHROMIUM ALLOYS
See also HASTELLOY C
HAYNES 188 ALLOY
INCONEL ALLOYS
STAINLESS STEELS
Hydridation
Hydrogen absorption and temperature programmed desorption (TPD) studies of iron- and chromium-substituted ZrV_2, 8:23214 (R:US)
CHROMODYNAMICS
See QUANTUM CHROMODYNAMICS
CHROMOSOMES
Genetic Mapping
Organization of the R chromosome region in maize, 8:24328 (R:US)
Molecular Structure
Chromosome chemistry, 8:24316 (RA:US)
CIGARETTES
See TOBACCO PRODUCTS
CIRCUIT BREAKERS
4000 shots with the ASDEX ohmic heating breaker, 8:25064 (J:US)
Feasibility Studies
Development of large-scale thyristor dc circuit breaker, 8:25059 (J:US)
CIRCUITS (MAGNETIC)
See MAGNETIC CIRCUITS
CITIES
See URBAN AREAS
CLADDING-FUEL INTERACTIONS
See FUEL-CLADDING INTERACTIONS
CLASSIFICATION
Probability
QDF misclassification probabilities for known population parameters, 8:25281 (J:US)

CLASSIFIED INFORMATION
Declassification
Public access to classified reports at the Los Alamos Scientific Laboratory, 8:25282 (R:US)
Information Dissemination
Public access to classified reports at the Los Alamos Scientific Laboratory, 8:25282 (R:US)
CLATHRATES
Phonons
Raman measurements of folded interlayer shearing phonons in KC_{12}/sub n/ (n = 2 approx. 6), 8:24032 (R:US)
CLAYS
See also BENTONITE
Ion Exchange
Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R:US)
Permeability
Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R:US)
Temperature Effects
Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R:US)
CLEAN WATER ACT
Prior to April 1980, FEDERAL WATER POLLUTION CONTROL ACT was used to index this concept.
Economic Impact
Review of the effects of the Clean Water Act on cooling-system selection by the steam-electric industry, 8:23427 (R:US)
CLIMATES
Data Compilation
Environmental data for sites in the National Solar Data Network, 8:23251 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23248 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23249 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23250 (R:US)
CLINCH RIVER BREEDER REACTOR
Fluid Flow
VARR2; CRBRP 2-dimensional transient fluid flow analysis (CDC7600; FORTRAN IV and COMPASS), 8:23509 (R:US)
Reactor Core Disruption
Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537, 8:23626 (R:US)
Reactor Licensing
Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537, 8:23626 (R:US)
Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537, 8:23625 (R:US)
Reactor Safety
Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537, 8:23626 (R:US)
Safety-Evaluation Report related to the construction of the Clinch River Breeder Reactor Plant. Docket No. 50-537, 8:23625 (R:US)
CLINTON P. ANDERSON MESON PHYSICS FACILIT
See LAMPF LINAC
CLOSTRIDIUM ACETOBUTYLICUM
Growth
Microbial mutagenesis and cell division, 8:24380 (RA:US)
CLOTHES DRYERS
Ventilation
Residential dryer-exhaust energy-reclamation demonstration project. Final report, 8:23814 (R:US)
Waste Heat Utilization
Residential dryer-exhaust energy-reclamation demonstration project. Final report, 8:23814 (R:US)
CLUSTER MODEL
Matrix Elements
Calculating matrix elements of slater determinant wave functions in the cluster model. Pt. 2, 8:24715 (R:DE)
COAL
See also BLACK COAL
Monthly energy review, 8:23002 (R:US)
Chemical Composition
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R:US)
Comparative study of the combustion of alternate liquid fuels, 8:22994 (R:US)
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Review of low-rank-coal AFBC testing, 8:22996 (R:US)
Chemical Properties
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Chemical Reactions
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Combustion
Computational tools for pulverized-coal combustion. Sixth quarterly report, July 1982-September 1982, 8:22999 (R:US)
Fluidized bed retrofit study of CE-VUX type boiler at the Jamestown Board of Public Utilities, Carlson Station, Jamestown, New York, 8:23424 (R:US)
Combustion Kinetics
COMB; 1-dimensional high-temperature coal combustor model (IBM370; PL/I), 8:23765 (R:US)
Combustion Products
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R:US)
Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA:US)
Polychlorinated dibenzo-p-dioxins: criteria for their effects on man and his environment, 8:22961 (R:CA)
Combustion Properties
Comparative study of the combustion of alternate liquid fuels, 8:22994 (R:US)
Comparative Evaluations
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R:US)
Review of low-rank-coal AFBC testing, 8:22996 (R:US)
Survey of coals treated by oxydesulfurization, 8:22992 (R:US)
Consumption Rates
Cost and quality of fuels for electric utility plants, 8:23413 (R:US)
Cost and quality of fuels for electric utility plants (November 1982), 8:23414 (R:US)
Cost
Cost and quality of fuels for electric utility plants, 8:23003 (R:US)
Desulfurization
Selective magnetic enhancement of pyrite in coal by dielectric heating, 8:22991 (R:US)
Dielectric Properties
Selective magnetic enhancement of pyrite in coal by dielectric heating, 8:22991 (R:US)
Energy Consumption
Quarterly coal report, July-September 1982, 8:23005 (R:US)
Exports
Prospects for future world coal trade (1980-2000), 8:23006 (R:US)
Quarterly coal report, July-September 1982, 8:23005 (R:US)
Flash Hydropyrolysis Process
The flash pyrolysis and hydropyrolysis of coal, 8:22901 (RA:CA)

Fluidized-Bed Combustion
Exploratory and basic fluidized-bed combustion studies. Annual report, October 1980-September 1981, 8:24148 (R:US)
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
High pressure combustor at Leatherhead Test seven results: dolomite size effects, 8:24151 (R:US)
Review of low-rank-coal AFBC testing, 8:22996 (R:US)
Fuel Consumption
Cost and quality of fuels for electric utility plants (For January 1982), 8:23410 (R:US)
Cost and quality of fuels for electric utility plants (For April 1982), 8:23411 (R:US)
Cost and quality of fuels for electric utility plants (For September 1982), 8:23412 (R:US)
Imports
Quarterly coal report, July-September 1982, 8:23005 (R:US)
Leachates
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R:IT)
Market
Modeling international steam-coal trade, 8:23007 (R:US)
Materials Recovery
Upgrading of waste material from coal washeries, 8:22956 (R:MX:In Spanish)
Moisture
Moisture determination by microwave heating, 8:22941 (R:GB)
Particle Size
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R:US)
Petrography
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Physical Properties
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Prices
Cost and quality of fuels for electric utility plants (For January 1982), 8:23410 (R:US)
Cost and quality of fuels for electric utility plants (For April 1982), 8:23411 (R:US)
Cost and quality of fuels for electric utility plants (For September 1982), 8:23412 (R:US)
Cost and quality of fuels for electric utility plants, 8:23413 (R:US)
Cost and quality of fuels for electric utility plants (November 1982), 8:23414 (R:US)
Rate guide for residential No. 2 heating oil and coal for SOLCOST Data Bank cities, 8:23001 (R:US)
Procurement
Petroleum logistics. Final report and summary, 8:23725 (R:US)
Production
Coal production: 1981, 8:23004 (R:US)
Quarterly coal report, July-September 1982, 8:23005 (R:US)
Pyrolysis
Hydropyrolysis of coal, 8:22935 (R:GB)
The flash pyrolysis and hydropyrolysis of coal, 8:22901 (RA:CA)
The pyrolysis of Canadian coals for the production of fuels and petrochemicals, 8:22906 (RA:CA)
Sorptive Properties
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R:IT)
Trade
Modeling international steam-coal trade, 8:23007 (R:US)
Prospects for future world coal trade (1980-2000), 8:23006 (R:US)
Transport
Petroleum logistics. Final report and summary, 8:23725 (R:US)

COAL DEPOSITS
See also COAL SEAMS
Exploration
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VIII. Coal quality analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23236 (R:US)
Leasing
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)

COAL GASIFICATION
See also CE ENTRAINED FUEL PROCESS
CS-R PROCESS
FLASH HYDROPYROLYSIS PROCESS
MERC PROCESS
Manuals
Handbook of gasifiers and gas-treatment systems (39 gasification processes and 40 gas processing systems), 8:22920 (R:US)
Thermal Efficiency
Transportation fuels from indirect coal liquefaction (US DOE; reviews and considers work in other countries), 8:22918 (R:US)

COAL GASIFICATION PLANTS
By-Products
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Capitalized Cost
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Design
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant. Final report (W.R. Grace project coal-gasification-methanol-gasoline project at Baskett, KY), 8:22922 (R:US)
Engineering
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant. Final report (W.R. Grace project coal-gasification-methanol-gasoline project at Baskett, KY), 8:22922 (R:US)
Environmental Effects
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)
Equipment
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Feasibility Studies
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Performance and maintenance in coal conversion synfuels plants, 8:23726 (RA:US)
Fuel Feeding Systems
Coal-feeder development. First quarterly technical progress report, October-December 1980, 8:22924 (R:US)

Industrial Medicine
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Legal Aspects
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)
Materials
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Materials Testing
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
Operating Cost
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Operation
Further development on a 170 MW prototype plant with pressurized coal gasification and gas-/steam turbine power plant at Luenen, 8:22912 (R:DE:In German)
Permit Applications
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)
Pollution Control
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Pressure Tubes
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
Pressure Vessels
Thermal/strain history effects on creep of refractory concrete, 8:22938 (J:US)
Thermomechanical behavior of refractory concrete linings, 8:22939 (J:US)
Solid Wastes
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Taxes
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)
Technology Assessment
Energy technology data handbook. Vol. 1, 8:23423 (R:DE)
Waste Water
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)

COAL INDUSTRY
Data Compilation
Coal production: 1981, 8:23004 (R:US)
Quarterly coal report, July-September 1982, 8:23005 (R:US)
Energy Accounting
Marginal energy cost of goods and services. Final report, 8:23037 (R:US)
Forecasting
Prospects for future world coal trade (1980-2000), 8:23006 (R:US)
Industrial Medicine
Industrial hygiene comprehensive survey, Cresap test facility, Cresap, West Virginia - a study of coal liquefaction processes. Final report, 8:23011 (R:US)

COAL LIQUEFACTION
See also EXXON LIQUEFACTION PROCESS
FLASH HYDROPYROLYSIS PROCESS
H-COAL PROCESS
SYNTHOIL PROCESS
An overview of coal liquefaction, processes with special reference to the pyrolysis of eastern Canadian coals, 8:22907 (RA:CA)
Liquefaction of Cape Breton coals, 8:22908 (RA:CA)
Catalysts
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R:US)
Chemical Composition
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Chemical Reactors
Conductivity probe and data acquisition for a liquefaction cold model, 8:22926 (R:US)
Coal Gasification
Optimization of combination of coal hydrogenation, Fischer-Tropach synthesis and gasification for the production of motor fuels, 8:22914 (R:DE:In German)
Comparative Evaluations
Overview of coal liquefaction in the US Department of Energy, 8:22917 (R:US)
Fischer-Tropsch Synthesis
Optimization of combination of coal hydrogenation, Fischer-Tropsch synthesis and gasification for the production of motor fuels, 8:22914 (R:DE:In German)
Health Hazards
Industrial hygiene comprehensive survey. Solvent Refined coal pilot plant, Fort Lewis, Washington - a study of coal liquefaction processes. Final report, 8:24258 (R:US)
Heaters
Proposal for research on heat transfer and hydrodynamics in preheaters for direct coal-liquefaction processes, 8:22928 (R:US)
Oil Yields
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R:US)
Pilot Plants
Overview of coal liquefaction in the US Department of Energy, 8:22917 (R:US)
Research Programs
Overview of coal liquefaction in the US Department of Energy, 8:22917 (R:US)
Residues
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Technology Assessment
World developments in coal liquefaction processes and how these developments could affect South American coal owning nations, 8:22934 (R:MX)

COAL LIQUEFACTION PLANTS
Corrosion
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Feasibility Studies
Performance and maintenance in coal conversion synfuels plants, 8:23726 (RA:US)
Fuel Slurries
Investigation of pulsation in slurry-pumping systems in coal-liquefaction plants. Final report, 8:22929 (R:US)
Industrial Medicine
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Materials
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Mathematical Models
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Pollution Control
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Technology Assessment
Energy technology data handbook. Vol. 1, 8:23423 (R:DE)
Valves
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Waste Water
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)

COAL LIQUIDS
Calorific Value
Coal liquefaction in SYNTHOIL reactor without added catalyst, 8:22916 (R:US)
Catalytic Cracking
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Chemical Composition
Comparative study of the combustion of alternate liquid fuels (Middle and high boiling SRC-II distillates coal-oil mixtures), 8:22994 (R:US)
Combustion
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
Combustion Properties
Comparative study of the combustion of alternate liquid fuels (Middle and high boiling SRC-II distillates coal-oil mixtures), 8:22994 (R:US)
Density
Coal liquefaction in SYNTHOIL reactor without added catalyst, 8:22916 (R:US)
Hydrocracking
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Hydrogenation
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Physical Properties
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Production
The pyrolysis of Canadian coals for the production of fuels and petrochemicals, 8:22906 (RA:CA)
Refining
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Skin Absorption
Dermal Pathology Program, 8:24446 (RA:US)
Supercritical Gas Extraction
Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R:US)
Toxicity
Dermal Pathology Program, 8:24446 (RA:US)
Systemic toxicology, 8:24442 (RA:US)
Viscosity
Coal liquefaction in SYNTHOIL reactor without added catalyst, 8:22916 (R:US)
COAL MINERS
Training
Toward safer underground coal mines, 8:23009 (R:US)
COAL MINES
Air Pollution Monitors
Development of a methane measuring equipment for several measuring points, 8:23008 (R:DE:In German)
COAL MINING
Dust Collectors
Development of dry-filter dust extractors to reduce dust development during operation of heading machines, 8:24229 (R:DE:In German)
Land Reclamation
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23235 (R:US)
Noise Pollution Abatement
Development of noise-abatement aids in underground mining operations, 8:22970 (R:DE:In German)
Planning
Development and integration of operational planning models for the coal mining industry in the Federal Republic of Germany (short title: Mining planning models), 8:22971 (R:DE:In German)
Safety
The Federal Coal Mine Health program in 1976. Annual report No. 7, 8:23010 (R:US)
Statistics
Coal mining in the West German power industry in 1981, 8:22979 (R:DE:In German)
Underground Mining
Development and integration of operational planning models for the coal mining industry in the Federal Republic of Germany (short title: Mining planning models), 8:22971 (R:DE:In German)
COAL PREPARATION
Evaluation
Coal preparation for synfuels: where do we stand, 8:22983 (R:US)
Heavy Media Separation
Dense-medium cycloning of fine coal at low specific gravities, 8:22987 (R:US)
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Magnetite recovery in coal washing by high-gradient magnetic separation. Quarterly project status report, 13th quarter, 8:22985 (R:US)
Magnetic Separators
Application of HGMS in coal preparation, 8:22986 (R:US)
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Process Control
Research on the fundamentals of process control in hard coal preparation, 8:22982 (R:DE:In German)
Research Programs
Current coal preparation research in the United States, 8:22989 (R:MX)
Solid Wastes
Investigation of the use of coal-waste as raw-material for the production of aluminium, 8:22944 (R:DE:In German)
COAL PREPARATION PLANTS
Automation
Automation of the mud and water circulation process at coal-preparation plant - initial study, 8:22988 (R:PL)
Equipment
World trends in coal preparation, 8:22990 (R:MX)
Mineral Wastes
Upgrading of waste material from coal washeries, 8:22956 (R:MX:In Spanish)
Water Supply
Automation of the mud and water circulation process at coal-preparation plant - initial study, 8:22988 (R:PL)
COAL SEAMS
Degassing
Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries (FRG), 8:22977 (R:PL)
Reducing the basic emission of methane by advance drainage, 8:22969 (R:DE:In German)
Stress Relaxation
Pilot working for the prevention of rock bumps in seam Wilhelm/Johann in Colliery Sachsen, 8:22968 (R:DE:In German)
COAL TAR
Toxicity
Roofing asphalts, pitch and UVL carcinogenesis, 8:24453 (R:US)
Systemic toxicology, 8:24442 (RA:US)
COAL-DERIVED LIQUIDS
See COAL LIQUIDS
COAL-FIRED MHD GENERATORS
See also MHD GENERATOR CDIF
MHD GENERATOR CFFF
Air Pollution Abatement
Provisional values for the thermodynamic properties of potassium sulfide, 8:23776 (R:US)
Boilers
Heat transfer in slagging MHD radiant boilers, 8:23770 (R:US)

Combustors
COMB; 1-dimensional high-temperature coal combustor model (IBM370; PL/I), 8:23765 (R:US)
Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R:US)
Diagnostic Techniques
MIE scattering theory for particle sizing interferometry with the dual beam laser velocimeter, 8:23773 (R:US)
MHD Channels
Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R:US)
Plasma Diagnostics
Evaluation of a modified-line-reversal temperature measurement in coal-fired MHD plasmas, 8:23774 (R:US)
Retrofitting
Performance advantages of a gas-stream MHD retrofit, 8:23772 (R:US)
Slags
COMRC1; slag transport models for MHD systems (IBM360,370,303x; FORTRAN IV), 8:23766 (R:US)
SLGTR; slag transport models for duct surfaces (IBM360,370; FORTRAN IV), 8:23764 (R:US)

COAL-OIL MIXTURES
See COAL
FUEL OILS
FUEL SLURRIES

COALTEK PROCESS
See FUEL FEEDING SYSTEMS

COASTAL REGIONS
Erosion
Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, 8:24267 (R:US)
Meetings
Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, 8:24267 (R:US)

COASTAL WATERS
Organic Compounds
Origins of dissolved organic matter in Southern California coastal waters: experiments on the role of zooplankton, 8:24272 (J:DE)

COATINGS
Surface Properties
Imaging and analysis of surfaces using diffracted electrons, 8:24068 (BA:US)
Thermal Shock
Thermal shock testing of low-Z coatings for JT-60, 8:24906 (J:NL)

COBALT
Catalytic Effects
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)

COBALT 57
Moessbauer Effect
Moessbauer investigation of defect trapping at ^{57}Co in coldworked aluminium, 8:23963 (RA:DE:In German)

COBALT 60
Adsorption
Field and laboratory evaluation of the mobility of cobalt-60/EDTA in an arid environment, 8:23167 (R:US)
Mobility
Field and laboratory evaluation of the mobility of cobalt-60/EDTA in an arid environment, 8:23167 (R:US)

COBALT ALLOYS
See also COBALT BASE ALLOYS
Electrochemical Corrosion
Corrosion behavior of high density tungsten alloys, 8:23899 (RA:US)

COBALT BASE ALLOYS
Stress Corrosion
Long time corrosion testing with and without mechanical stress of high temperature alloys for blades of land based gas turbines with high output, 8:23892 (R:DE:In German)

COBALT OXIDES
Self-Diffusion
Diffusion mechanisms in transition-metal oxides, 8:23995 (R:US)
Sorptive Properties
Hydrides of oxygen-stabilized intermetallic phases (Zr_3V_3O; Ti_4M_3O/sub x/ (M = Fe, Co, Ni)), 8:23998 (R:US)

COBALT SULFATES
Fusion Heat
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)
Melting Points
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)
Phase Diagrams
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)

COGENERATION
Prior to November 1980, this concept was indexed to CO-GENERATION.
See COGENERATION
Air Pollution Abatement
Cogeneration and emission offsets in nonattainment areas, 8:23700 (R:US)
Economics
Chances of continued heat and power generation in public power stations in combination with district heating, 8:23747 (R:DE:In German)

COGENERATION PLANTS
See DUAL-PURPOSE POWER PLANTS

COILS (MAGNETIC)
See MAGNET COILS

COKE
Additives
The influence of tar and pitch additions to caking coals on the anisotropic composition and microstrength of coke, 8:22911 (R:GB)
Material Substitution
Optimum conditions (technical and economic) for steel industry coke, 8:22932 (R:MX:In Spanish)
Production
Recent developments in blast furnace coke production, 8:22933 (R:MX)
Tensile Properties
The influence of tar and pitch additions to caking coals on the anisotropic composition and microstrength of coke, 8:22911 (R:GB)
Uses
Project study gas, tar and oil production by devolatilization of power station coal, 8:22913 (R:DE:In German)
Wear Resistance
The influence of tar and pitch additions to caking coals on the anisotropic composition and microstrength of coke, 8:22911 (R:GB)

COKE OVENS
Optimization
Recent developments in blast furnace coke production, 8:22933 (R:MX)

COLD STORAGE
Economic Analysis
Assessment of cool storage in commercial building applications, 8:23664 (R:US)
Economics of cool storage for electric load leveling, 8:23426 (J:US)
Feasibility Studies
Assessment of cool storage in commercial building applications, 8:23664 (R:US)
Economics of cool storage for electric load leveling, 8:23426 (J:US)

COLLECTIVE ACCELERATORS
Performance
IFA-2 collective-ion-accelerator system, 8:24188 (R:US)
COLLECTRONS
See SELF-POWERED NEUTRON DETECTORS
COLLIERIES
See COAL MINES
COLLISIONAL PLASMA
Hamiltonians
Time-dependent drift Hamiltonian, 8:24772 (R:US)
Transport Theory
Time-dependent drift Hamiltonian, 8:24772 (R:US)
COLLISIONLESS PLASMA
Electric Conductors
Plasma wake of mesosonic conducting bodies. Pt. 2. An experimental parametric study of the mid-wake ion density peak, 8:24799 (J:GB)
Equilibrium
Equilibrium and stability of collisionless systems in the paraxial limit, 8:24802 (J:GB)
Stability
Equilibrium and stability of collisionless systems in the paraxial limit, 8:24802 (J:GB)
COLON
See LARGE INTESTINE
COLORADO
Geochemical Surveys
Geothermal-resource assessment of Ranger Warm Spring, Colorado. Resources Series 24, 8:23369 (R:US)
Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22, 8:23368 (R:US)
Geological Surveys
Geothermal-resource assessment of Ranger Warm Spring, Colorado. Resources Series 24, 8:23369 (R:US)
Geophysical Surveys
Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22, 8:23368 (R:US)
Natural Gas Deposits
Approximation of continuity of lenticular Mesaverde Group sandstone lenses utilizing close-well correlations, Piceance Basin, NW Colorado. SPE 11610, 8:23059 (R:US)
Mineralogy and petrology aspects of Mesaverde Formation at Rifle Gap, Colorado, specific to the sedimentology and gas-bearing intervals in the subsurface, 8:23060 (R:US)
Oil Shale Deposits
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R:US)
Resource Assessment
Geothermal-resource assessment of Ranger Warm Spring, Colorado. Resources Series 24, 8:23369 (R:US)
Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22, 8:23368 (R:US)
Stratigraphy
Approximation of continuity of lenticular Mesaverde Group sandstone lenses utilizing close-well correlations, Piceance Basin, NW Colorado. SPE 11610, 8:23059 (R:US)
Uranium Deposits
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R:US)
COLUMBIA RIVER
Hydrology
Unsteady-flow model of Priest Rapids Dam releases at Hanford Reach, Columbia River, Washington, 8:24270 (R:US)
Levels
Unsteady-flow model of Priest Rapids Dam releases at Hanford Reach, Columbia River, Washington, 8:24270 (R:US)
COLUMBIUM
See NIOBIUM
COLUMNS (MECHANICAL)
See MECHANICAL STRUCTURES
COMANCHE PEAK-1 REACTOR
Reactor Licensing
Safety Evaluation Report related to the operation of Comanche Peak Steam Electric Station, Units 1 and 2. Docket Nos. 50-445 and 50-446, 8:23622 (R:US)
Reactor Safety
Safety Evaluation Report related to the operation of Comanche Peak Steam Electric Station, Units 1 and 2. Docket Nos. 50-445 and 50-446, 8:23622 (R:US)
COMANCHE PEAK-2 REACTOR
Reactor Licensing
Safety Evaluation Report related to the operation of Comanche Peak Steam Electric Station, Units 1 and 2. Docket Nos. 50-445 and 50-446, 8:23622 (R:US)
Reactor Safety
Safety Evaluation Report related to the operation of Comanche Peak Steam Electric Station, Units 1 and 2. Docket Nos. 50-445 and 50-446, 8:23622 (R:US)
COMBINED GAS AND STEAM CYCLE POWER PLANTS
See COMBINED-CYCLE POWER PLANTS
COMBINED STEAM-POWER GENERATION
See COGENERATION
COMBINED-CYCLE POWER PLANTS
Prior to March, 1976, the descriptors COMBINED CYCLES and FOSSIL-FUEL POWER PLANTS or THERMAL POWER PLANTS were used for indexing this concept.
Economic Analysis
Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report, 8:23416 (R:US)
Feasibility Studies
Performance advantages of a gas-stream MHD retrofit, 8:23772 (R:US)
Fluidized-Bed Combustion
Electrostatically augmented gas-cleanup devices for particular removal, 8:22947 (R:US)
Gas Turbines
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
Off-Gas Systems
Electrostatically augmented gas-cleanup devices for particular removal, 8:22947 (R:US)
Operation
Further development on a 170 MW prototype plant with pressurized coal gasification and gas-/steam turbine power plant at Luenen, 8:22912 (R:DE:In German)
Low chemical concentrating steam generating cycle, 8:23425 (P:US)
Performance
Gas-Turbine Evaluation (GATE) Computer Program: thermodynamic cycles, methods, and sample cases. Final report, 8:23417 (R:US)
Pollution Control Equipment
Electrostatically augmented gas-cleanup devices for particular removal, 8:22947 (R:US)
Steam Generators
Low chemical concentrating steam generating cycle, 8:23425 (P:US)
Systems Analysis
Off-design study of an open cycle MHD power plant with oxygen enrichment, 8:23769 (R:US)
COMBUSTION
See also FLUIDIZED-BED COMBUSTION
IN-SITU COMBUSTION
Additives
Advanced environmental control technology , 8:22952 (R:US)
Test Facilities
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R:US)
COMBUSTION ENGINEERING GASIFICATION PROCE
See CE ENTRAINED FUEL PROCESS
COMBUSTION KINETICS
Computerized Simulation
Sandia technology, 8:23882 (R:US)
Research Programs
Sandia technology, 8:23882 (R:US)

COMBUSTION PRODUCTS
Environmental Effects
Polychlorinated dibenzo-p-dioxins: criteria for their effects on man and his environment, 8:22961 (R:CA)
Health Hazards
Tobacco smoke in occupied spaces: ventilation requirements. Paper 81.22.4, 8:23831 (J:US)
Hot Gas Cleanup
Advanced environmental control technology , 8:22952 (R:US)
COMBUSTORS
See also FLUIDIZED-BED COMBUSTORS
Computerized Simulation
COMB; 1-dimensional high-temperature coal combustor model (IBM370; PL/I), 8:23765 (R:US)
Efficiency
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
COMMERCIAL BUILDINGS
Cold Storage
Assessment of cool storage in commercial building applications, 8:23664 (R:US)
Economics of cool storage for electric load leveling, 8:23426 (J:US)
Energy Conservation
Analysis of commercial energy-conservation data. Final report, 8:23813 (R:US)
Local-government energy-conservation programs and their impact on rental buildings, 8:23704 (R:US)
Rankine Cycle Power Systems
STESEP; solar total energy system evaluation (CDC6600,7600;IBM370; FORTRAN IV), 8:23297 (R:US)
Solar Space Heating
Solar-energy-system performance evaluation. Concord Light Plant municipal garage and office building, Concord, Massachusetts, November 1978-March 1979, 8:23348 (R:US)
Thermal Energy Storage Equipment
Economics of cool storage for electric load leveling, 8:23426 (J:US)
COMMERCIAL SECTOR
Energy Consumption
1981 commercial and industrial survey: customers of municipal and cooperative distributors of TVA power, 8:23752 (R:US)
Energy Demand
Development and application of the NPPC commercial-energy-demand model, 8:23694 (R:US)
Population Dynamics
Patterns of change in the business community of energy boomtowns, 8:23698 (R:US)
Power Demand
Typical electric bills. January 1, 1982, 8:23730 (R:US)
COMMERCIALIZATION
Program Management
Five-megawatt geothermal-power pilot-plant project, 8:23375 (R:US)
COMMUNITIES
Energy Audits
Community energy audit: a discussion of process, resources, and potential problems, 8:23754 (R:US)
Energy Consumption
TDIST2; community energy consumption analysis (IBM370,303x; FORTRAN IV, IBM FORTRAN G compiler), 8:23872 (R:US)
Energy Management
Content of local-energy-management programs, 8:23703 (R:US)
COMPACT TORUS
Prior to October 1982, this concept was indexed to THERMONUCLEAR DEVICES or to a particular experiment if known, e.g., REVERSE-FIELD PINCH.
Engineering needs of a TRACT fusion reactor program, 8:24952 (J:US)
Breeding Blankets
TRACT reactor blanket study (Triggered-reconnection, compact, toroid), 8:24977 (J:US)
COMPLEX TERRAIN
Drainage
Two-dimensional dynamical drainage-flow model with Monte Carlo transport and diffusion calculations, 8:24234 (R:US)
COMPOSITE MATERIALS
See also SUPERCONDUCTING COMPOSITES
Creep
High temperature automated creep testing of ceramic fiber board, 8:24017 (RA:US)
Flexural Strength
Weathering of sheet molding compounds (Vinyl ester sheet molding compounds), 8:24018 (RA:US)
Kapitza Resistance
Kapitza thermal boundary resistance between two solids, 8:24746 (BA:US)
Meetings
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Tensile Properties
Weathering of sheet molding compounds (Vinyl ester sheet molding compounds), 8:24018 (RA:US)
Thermal Conductivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Thermal Diffusivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
Weathering
Weathering of sheet molding compounds (Vinyl ester sheet molding compounds), 8:24018 (RA:US)
COMPOUND NUCLEI
Energy-Level Transitions
GNASH; particle induced cross-sections & spectra (CDC7600; FORTRAN and COMPASS), 8:24671 (R:US)
COMPOUND-NUCLEUS REACTIONS
Computer Codes
GNASH; particle induced cross-sections & spectra (CDC7600; FORTRAN and COMPASS), 8:24671 (R:US)
Cross Sections
GNASH; particle induced cross-sections & spectra (CDC7600; FORTRAN and COMPASS), 8:24671 (R:US)
COMPOUNDS (ORGANIC)
See ORGANIC COMPOUNDS
COMPRESSED AIR ENERGY STORAGE
Environmental Impacts
Review of environmental studies and issues on compressed-air energy storage, 8:23659 (R:US)
Legal Aspects
Review of environmental studies and issues on compressed-air energy storage, 8:23659 (R:US)
COMPRESSED AIR STORAGE POWER PLANTS
Performance
Thermodynamic analysis of five compressed-air energy-storage cycles, 8:23660 (R:US)
Thermal Energy Storage Equipment
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R:US)
Thermodynamic Cycles
Thermodynamic analysis of five compressed-air energy-storage cycles, 8:23660 (R:US)
COMPRESSORS
Design
Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23854 (R:DE:In German)
COMPUTER CODES
Computer codes are indexed by their initial letter and CODES, e.g., A CODES. If the code name begins with a number the code is indexed to NUMBER CODES.
A Codes
ABCD; atom-triatom nonreactive collisions (CDC7600,CYBER175; FORTRAN IV), 8:24511 (R:US)
ABCRR;ABCRRJ; A+BC classical trajectory study (CDC7600,CYBER175; FORTRAN IV), 8:24512 (R:US)
ADVCON; advance control 93 APT postprocessor (CDC CYBER174,175; FORTRAN IV), 8:24095 (R:US)
ALVIN; differential-integral data consistency (CDC7600; FORTRAN IV), 8:24639 (R:US)

ANOVA; three factor analysis of variance (CDC6600; FORTRAN IV), 8:25247 (R:US)
ASPEN; advanced system for process engineering (IBM303x;DEC VAX11/780; FORTRAN IV (99%) and Assembly language (1%) for the IBM CMS version. All of ASPEN except easily replaceable system utilities is written in ANS FORTRAN X3.9-1966. THE DEC VAX version is completely FORTRAN IV.), 8:22899 (R:US)
ATM; atmospheric transport & diffusion model (IBM360,370; FORTRAN IV (96%) and BAL (4%)), 8:24227 (R:US)
AXICRP; finite element code for creep analysis (CDC6600,7600,CYBER74; FORTRAN IV), 8:23513 (R:US)
Thermal-hydraulic code qualification: ATHOS2 and data from Bugey 4 and Tricastin 1. Final report, 8:23499 (R:US)

Algorithms

Theory of the geometric algorithm of the DEROB program, 8:23806 (RA:US)

B Codes

BASIC2 INTERPRETER; minimal basic language (MCS-80,8080-based microcomputers; 8080 Assembly language), 8:25243 (R:US)
BEACON/MOD3; containment system fluid flow (CDC CYBER176;CDC7600; FORTRAN IV (98%) and COMPASS (2%)), 8:23579 (R:US)
BECKDRY; dry cooling for steam-electric plants (CDC6600,7600; FORTRAN IV), 8:23398 (R:US)
BECOM-BNL; buildings energy optimization model (CDC7600; PDS), 8:23795 (R:US)
BEHAVE-SST; overpower transient fuel mechanics (CDC7600; FORTRAN IV), 8:23512 (R:US)
BENDPAC; stress analysis of flanged pipe bends (IBM303x,370; FORTRAN IV (93%) and Assembly language (7%)), 8:24099 (R:US)
BICYCLE; levelized life cycle cost calculation (CDC6600,CYBER175; FORTRAN IV), 8:23404 (R:US)
BLOCKS: a block-motion code for geomechanics studies, 8:24493 (R:US)
BONAMI-S: response self-shielding by the Bondarenko method. Volume 2. Functional studies (BONAMI-S code), 8:23543 (R:US)
BXAMER; hustler two-axis lathe APT postprocessor (CDC CYBER174,175; FORTRAN IV (greater than 99%) and COMPASS (less than 1%)), 8:24097 (R:US)

C Codes

CACECO; LMFBR containment accident analysis (CDC CYBER74;CDC7600; CDC FORTRAN Extended with only a few statements that do not comply with the American National Standards Institute (ANSI) FORTRAN.), 8:23511 (R:US)
CHART; iodine decay heat on charcoal adsorbers (IBM360,370,303x; FORTRAN IV), 8:23583 (R:US)
CHNSED; sediment & containment transport model (IBM360,370; FORTRAN IV (96%) and BAL (4%)), 8:24275 (R:US)
CLAP; linear control system design analysis (Commodore PET with IEEE 488 Bus interface and peripherals; BASIC), 8:24100 (R:US)
COMB; 1-dimensional high-temperature coal combustor model (IBM370; PL/I), 8:23765 (R:US)
COMPARE/MOD1A; transient flow with sinks & doors (CDC7600,CYBER175; FORTRAN IV), 8:23468 (R:US)
COMRC1; slag transport models for MHD systems (IBM360,370,303x; FORTRAN IV), 8:23766 (R:US)
CONDYN; Polya model secondary electron spectra (CDC6600,7600; FORTRAN IV), 8:24510 (R:US)
CONF; conference attendee & speaker data file (CDC6600; COBOL 4.5.), 8:25254 (R:US)
CONSEPT; controller-run solvent extraction (IBM3033,360,370; FORTRAN IV (98%) and BAL (2%)), 8:23110 (R:US)
CONTEMPT4/MOD2; multicompartment containment (CDC7600; FORTRAN IV (96%) and COMPASS (4%)), 8:23584 (R:US)
COREL;RASE4;DAMG2; ion implantation deposition (CDC6600,7600; FORTRAN IV. The programs, originally written for the FUN compiler, were translated by the NESC for compilation under FTN.), 8:24718 (R:US)
CORTES; thermal & mechanical analysis of tees (IBM360,370; FORTRAN IV; Package of EP, THFA, SHFA, SA, and TSA codes), 8:24085 (R:US)
COVE1; creep collapse for oval fuel pin tube (CDC6600; FORTRAN IV), 8:23555 (R:US)
CRAC calculations for accident sections of environmental statements, 8:23633 (R:US)
CREEP-PLAST2; 2-dimensional inelastic structural analysis (IBM360,370; FORTRAN IV (95%) and BAL (5%)), 8:24090 (R:US)
CURT2; curved tubes or elbows & attached pipes (IBM360,370; FORTRAN IV), 8:24084 (R:US)
Fortran computer-code package for the evaluation of gas-phase viscosities, conductivities, and diffusion coefficients (CHEMKIN), 8:24137 (R:US)

D Codes

2DEPEP; elliptic, parabolic & eigenvalue solutions. (CDC6500,7600; FORTRAN IV), 8:25244 (R:US)
Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982, 8:23804 (R:US)
COREL;RASE4;DAMG2; ion implantation deposition (CDC6600,7600; FORTRAN IV. The programs, originally written for the FUN compiler, were translated by the NESC for compilation under FTN.), 8:24718 (R:US)
DAP; deuterium depth profile in uniform solids (IBM303x; FORTRAN IV), 8:23993 (R:US)
DEMONR; unbiased Monte Carlo slab shield code (IBM360/65; FORTRAN IV), 8:24716 (R:US)
DENDRO; hierarchical cluster analysis of data (IBM360,370; FORTRAN IV (98%) and Assembly language (2%)), 8:25255 (R:US)
DISPL1; 1- and 2-dimensional kinetics-diffusion partial differential equations solution (IBM370/195,303x;CDC7600,6600,CYBER175; MORTRAN2 (80%) and FORTRAN (20%)), 8:24569 (R:US)
DOE2.1A; building energy consumption analysis (CDC7600,6600,CYBER175;IBM370,303x;DEC10,20; FORTRAN (99.9%) and COMPASS (0.1%) for the CDC version. The IBM and DEC versions are all FORTRAN.), 8:23794 (R:US)
DOECTZDATA; California sixteen-zone weather data (IBM360), 8:25223 (R:US)
DOPSEL; self-shielding in the resonance region (IBM370; FORTRAN IV), 8:24702 (R:US)
DPOLE; helmholtz equation on general 3-dimensional region (CDC6600,7600; FORTRAN IV, FTN 4.6+460 compiler), 8:25246 (R:US)
DRIFT; cooling tower drift eliminator analysis (IBM370,303x; FORTRAN IV), 8:23399 (R:US)
DSNP; dynamic simulation nuclear power plants (IBM370; FORTRAN IV and DSNP), 8:23539 (R:US)
DWG100RQ;DWG101RQ; convert to or from SI units (IBM360,370,303x; FORTRAN IV (85%) and COBOL Version 4 (15%)), 8:25245 (R:US)
OCOPTR;DRVOCR; unconstrained optimization (IBM360,370; FORTRAN IV), 8:25233 (R:US)
Preliminary daylighting studies for incorporation into DEROB, 8:23807 (RA:US)
Theory of the geometric algorithm of the DEROB program, 8:23806 (RA:US)
Thermal network solution of the DEROB program, 8:23805 (RA:US)

E Codes

CORTES; thermal & mechanical analysis of tees (IBM360,370; FORTRAN IV; Package of EP, THFA, SHFA, SA, and TSA codes), 8:24085 (R:US)
EGUN; calculation of electron trajectories (IBM370,303x,3081; FORTRAN IV (99%) and Assembler (1%)), 8:24167 (R:US)
ELLIPTIC; elliptic integrals by duplication (NAS AS/6;IBM370 (designed to be machine-independent); FORTRAN IV), 8:25262 (R:US)
EVITS; steady state two-dimensional fluid flow (IBM360,370; FORTRAN IV), 8:24568 (R:US)

F Codes

FASTCAR; solution of Cauchy-Riemann equations (CDC6600,7600;IBM360,370; FORTRAN IV), 8:25251 (R:US)

FCHART/SLR2.0; solar heating system performance (DEC20;DEC VAX11/780; FORTRAN 77), 8:23311 (R:US)

FRANTIC-NRC; time-dependent system unavailability (IBM370; FORTRAN IV), 8:25236 (R:US)

FUELS DATA; model verification fuel rod data (CDC CYBER176,175;CDC7600; FORTRAN IV for the auxiliary edit program, data are recorded as EBCDIC characters.), 8:23446 (R:US)

G Codes

GAPCON-THERMAL3; fuel steady state & transient behavior (CDC6600,7600,CYBER74; CDC Extended FORTRAN IV), 8:23554 (R:US)

Gas-Turbine Evaluation (GATE) Computer Program: thermodynamic cycles, methods, and sample cases. Final report, 8:23417 (R:US)

GASPAR; evaluation of atmospheric releases (IBM370,303x; FORTRAN IV (98%) and Assembly language (2%)), 8:24248 (R:US)

GCFM5.0; geothermal field & power plant costs (IBM370,303x; FORTRAN IV), 8:23378 (R:US)

GEOCITY; geothermal district heating economics (CDC CYBER74;CDC6600,7600; FORTRAN IV), 8:23384 (R:US)

GLOVE CHANGE ANALYSIS SYSTEM; glove data base (IBM360; COBOL with TOTAL DBMS (95%) and Assembler (5%)), 8:24091 (R:US)

GNASH; particle induced cross-sections & spectra (CDC7600; FORTRAN and COMPASS), 8:24671 (R:US)

GRFPAK; plot package for CORTES FEM programs (IBM360,370; FORTRAN IV), 8:24086 (R:US)

H Codes

Generalized heating and cooling load models for seasonal performance calculation, 8:23838 (J:US)

HAARM3; aerosol behavior log-normal dist model (CDC6400,7600,CYBER73; FORTRAN IV, FTN4.5 (CDC7600)), 8:23582 (R:US)

HAUSER5; nuclear reaction cross sections (UNIVAC1100/44; FORTRAN V), 8:24640 (R:US)

HEMP; hydrodynamic elasticmagneto plastic flow (CDC7600; FORTRAN IV, LLL CHAT compiler), 8:24567 (R:US)

I Codes

Documentation of International Energy Evaluation System. Volume 1. Overview, 8:23687 (R:US)

ICOP; financial model industrial cogeneration (CDC CYBER170,175; FORTRAN IV), 8:23406 (R:US)

IMPORTANCE; FTA basic event & cut set ranking (IBM370; FORTRAN IV), 8:25240 (R:US)

INGEN; finite element program mesh generator (CDC7600; FORTRAN IV), 8:25261 (R:US)

IP2D.REV1; resistivity & induced-polarization (UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%)), 8:23367 (R:US)

L Codes

Analysis of financial assumptions in selected Energy Information Administration models, 8:23711 (R:US)

L2RMAT; coupled channel inelastic scattering (CDC7600,CYBER175; FORTRAN IV), 8:24747 (R:US)

LADTAP2; liquid pathway dose calculations (IBM360,370,303x;CDC7600,CYBER175; FORTRAN IV), 8:24293 (R:US)

LCLSQ1; linear least squares with constraints (IBM303x,360,370; FORTRAN), 8:25264 (R:US)

LINPACK; simultaneous linear algebraic equations (IBM360,370 (designed to be machine-independent); FORTRAN), 8:25242 (R:US)

LR; LR(1) grammar analyzer & parser generator (IBM370; FORTRAN (ANSI X3.9-1966)), 8:25249 (R:US)

User's Manual for the TVA Lumber Yield and Value File Utility Program. Version 1.0, 8:24356 (R:US)

Libraries

XERROR; Fortran library error-handling package (CDC7600,6600,CYBER175 (designed to be machine-independent); FORTRAN 66 and FORTRAN 77), 8:25263 (R:US)

M Codes

MAEROS user manual (LMFBR), 8:23627 (R:US)

MESA; maximum entropy time series analysis (IBM360,370; FORTRAN IV), 8:25250 (R:US)

MOL1D; partial differential equations solution (CDC6600,7600;Amdahl470;IBM3033; FORTRAN IV), 8:25253 (R:US)

MSF21;VTE21; desalination plant optimization (IBM360,370; FORTRAN (97%) and BAL (3%)), 8:24088 (R:US)

N Codes

Development and application of the NPPC commercial-energy-demand model, 8:23694 (R:US)

NALAP; LMFBR transient response to accident (CDC7600,CYBER76; FORTRAN IV (99%) and COMPASS (1%)), 8:23581 (R:US)

NIKE2D: a vectorized, implicit, finite-deformation, finite-element code for analyzing the static and dynamic response of 2-D solids, 8:24143 (R:US)

NJE; VAX-VMS IBM NJE network protocol emulator (DEC VAX11/780; VAX-11 FORTRAN 77 (99%) and MACRO-11 (1%)), 8:25260 (R:US)

NONSAP-C; nonlinear stress concrete structures (CDC7600; FORTRAN IV (CDC FORTRAN Extended)), 8:24026 (R:US)

NUBOW-2D Inelastic; bowed reactor core analysis (IBM370; FORTRAN IV), 8:23514 (R:US)

O Codes

OCOPTR;DRVOCR; unconstrained optimization (IBM360,370; FORTRAN IV), 8:25233 (R:US)

ODMOD; soil-water trace-containment transport (IBM360,370; FORTRAN IV (97%) and BAL (3%)), 8:24274 (R:US)

OKUMA; OKUMA two-axis lathe APT postprocessor (CDC CYBER174,175; FORTRAN IV (greater than 99%) and COMPASS (less than 1%)), 8:24098 (R:US)

OPTIMIZERS; nonlinear optimization subroutines (IBM360,370; FORTRAN IV), 8:25252 (R:US)

OPTRM; hydrologic transport with optimization (IBM360,370; FORTRAN IV (96%) AND BAL (4%)), 8:24276 (R:US)

P Codes

PCTEST; principal component test for outliers (IBM360,370; FORTRAN IV), 8:25237 (R:US)

PDEONE; solutions of partial differential equations (CDC7600,6600; FORTRAN IV), 8:25239 (R:US)

PELSHIE2; point kernel integration shielding (IBM360,303x; FORTRAN IV (99%) and BAL (1%)), 8:24720 (R:US)

PHOS1; pH & conductivity of sodium phosphate solutions (DEC10; BASIC), 8:24055 (R:US)

PICES; utility static generation reliability (IBM303x,360,370; FORTRAN IV), 8:23401 (R:US)

PLANMAP.REV1; plots geochemical data in plan (UNIVAC1108,1100; FORTRAN V (97%) and Assembly language (3%)), 8:23365 (R:US)

POLUTE; forest air pollutant uptake model (IBM360,370; CSMP), 8:24301 (R:US)

PREMOR; two-group point reactor power plant model (IBM360,370,303x; FORTRAN IV (97%) and Assembler (3%)), 8:23540 (R:US)

PRODCOST; utility generating cost simulation (IBM360,370,303x; FORTRAN IV (97%) and Assembler (3%)), 8:23403 (R:US)

PROMSYS; programmed equipment maintenance (IBM370; ANS COBOL (97%) and Assembly language (3%)), 8:24094 (R:US)

PROSA2; probabilistic response surface studies (IBM370; FORTRAN IV (95%) and Assembly language (5%)), 8:23580 (R:US)

PRPLOT; line printer plot subroutine package (IBM370,360; FORTRAN IV), 8:25238 (R:US)

PTA1; pipe system pressure analysis (IBM370/195; FORTRAN IV), 8:23510 (R:US)

PTTOPT; point-to-point tool APT postprocessor (CDC CYBER174,175; FORTRAN IV), 8:24096 (R:US)

PUBG; purex solvent extraction process model (IBM3033;CDC CYBER175; FORTRAN IV), 8:23111 (R:US)

STEEP4; thermonuclear reaction rates (CDC6600,7600; FORTRAN IV), 8:24758 (R:US)

PH Value

PHOS1; pH & conductivity of sodium phosphate solutions (DEC10; BASIC), 8:24055 (R:US)

Q Codes

QUIKIE: a plotting routine to produce quick and easy graphs. Reference manual, 8:25279 (R:US)

R Codes

Computer control of electrochemical experiments with application to zinc/nickel oxide cells (REAL-TIME and WATCHDOG codes), 8:23679 (R:US)

COREL;RASE4;DAMG2; ion implantation deposition (CDC6600,7600; FORTRAN IV. The programs, originally written for the FUN compiler, were translated by the NESC for compilation under FTN.), 8:24718 (R:US)

Large-area sheet task: advanced dendritic-web-growth development. Annual report, October 23, 1981-October 22, 1982 (RIBBON), 8:23267 (R:US)

RADTRAN II user guide, 8:23117 (R:US)

RANDOM NUMBERS; obtained from U235 alpha decay (IBM370,303x; Binary (random numbers) and FORTRAN IV (AFRAND and Driver)), 8:25256 (R:US)

RATEPAC; power plant revenue requirements code (IBM303x,360,370; FORTRAN IV), 8:23405 (R:US)

REFLUX; LWR reflood heat transfer prediction (IBM360; FORTRAN IV), 8:23445 (R:US)

RO75; reverse osmosis desalting plant design (IBM360,370,303x; FORTRAN IV (92%) and Assembly language (8%)), 8:24093 (R:US)

Research Programs

Continuing development of the DEROB system. Final report, June 1, 1980-November 30, 1982, 8:23804 (R:US)

S Codes

CORTES; thermal & mechanical analysis of tees (IBM360,370; FORTRAN IV; Package of EP, THFA, SHFA, SA, and TSA codes), 8:24085 (R:US)

Generalized heating and cooling load models for seasonal performance calculation, 8:23838 (J:US)

SCHAFF; heat & water transfer in porous media (CDC7600; FORTRAN IV), 8:23362 (R:US)

SECTION.REV1; plot geochemical drill hole data (UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%)), 8:23379 (R:US)

SHOCK; dynamic response of lumped-mass systems (CDC6600,7600; FORTRAN IV), 8:24087 (R:US)

SKILLS INVENTORY; personnel information system (CDC6400,7600; FORTRAN IV; package of SKILLS, SKLFORM, AND SEARCH codes), 8:25224 (R:US)

SLAB: a time-dependent computer model for the dispersion of heavy gases released in the atmosphere, 8:23068 (R:US)

SLACKLY; 1-dimensional multicavity klystron tube analysis (IBM360,370; FORTRAN IV), 8:24166 (R:US)

SLATEC1.0; mathematical subroutine library (CRAY1;CDC CYBER175 (designed to be machine-independent); FORTRAN), 8:25248 (R:US)

SLGTR; slag transport models for duct surfaces (IBM360,370; FORTRAN IV), 8:23764 (R:US)

SLIC; interactive graphics 3-d mesh generation (CDC7600; FORTRAN IV (99%) and COMPASS (1%)), 8:25259 (R:US)

SLUMB.REV0; one-dimensional Schlumberger inversion program (UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%)), 8:23364 (R:US)

SOERP; second-order error propagation code (IBM360,370;CDC7600; FORTRAN IV), 8:25234 (R:US)

SOFTWARE TOOLS; program development interface (Base version (This version is not tailored to any one machine but serves as a portable base for the user who can add "primitives" or modify the base source to tailor SOFTWARE TOOLS to the local computing environment.); FORTRAN IV and RATFOR), 8:25258 (R:US)

SOLA-DF; transient 2-dimensional 2-phase flow (CDC7600; FORTRAN IV), 8:24136 (R:US)

SOLTES1; thermal energy systems simulation (CDC6600,7600; FORTRAN IV (99%) and COMPASS (1%)), 8:23663 (R:US)

SOMIX1; sodium spray fires in cylindrical cell (IBM370; FORTRAN IV H Extended), 8:23508 (R:US)

SPAR1; shielding with analytic ray-tracing (CDC6600,7600; FORTRAN IV), 8:24719 (R:US)

SPEKEN; Pearson, Spearman & Kendall correlation (IBM360,370; FORTRAN IV), 8:25241 (R:US)

SPXCPL; two-dimensional modeling of self-potential effects (PRIME400;DEC VAX11/780; FORTRAN IV), 8:23366 (R:US)

STESEP; solar total energy system evaluation (CDC6600,7600;IBM370; FORTRAN IV), 8:23297 (R:US)

STOPS; power system short-term optimization (IBM303x,360,370; FORTRAN IV), 8:23402 (R:US)

SULCAL; model of sulfur chemistry in a plume (IBM360,370; FORTRAN IV), 8:24228 (R:US)

SUPAN; analysis of beam-type piping supports (CDC7600; FORTRAN IV), 8:23400 (R:US)

SWAP9; stress-wave analysis in 1-dimensional strain (CDC6600,7600; FORTRAN IV), 8:24092 (R:US)

SWIFT; waste-isolation flow & transport model (CDC7600; FORTRAN IV), 8:23377 (R:US)

SYSREL; reliability analysis of series systems (Honeywell Series 60 Level 66,6000; BASIC), 8:25257 (R:US)

T Codes

CORTES; thermal & mechanical analysis of tees (IBM360,370; FORTRAN IV; Package of EP, THFA, SHFA, SA, and TSA codes), 8:24085 (R:US)

TDIST2; community energy consumption analysis (IBM370,303x; FORTRAN IV, IBM FORTRAN G compiler), 8:23872 (R:US)

TIMEX; 1-dimensional time-dependent multigroups discrete ordinates (IBM360,370;CDC7600; FORTRAN IV), 8:24717 (R:US)

TRAC-PD2/MOD1; best-estimate analysis PWR LOCA (CDC7600; FORTRAN IV (FTN 4.5 FORTRAN compiler) with selected COMPASS replacement routines), 8:23585 (R:US)

TRANSPORT; design of charged particle beams (IBM370; FORTRAN IV), 8:24165 (R:US)

TRITMOD; advection model of tritium dispersion (IBM360; CSMP), 8:24261 (R:US)

TRUMP; transient & steady state temperature distribution (IBM360,370;CDC7600; FORTRAN IV (95%) and BAL (5%) (IBM); FORTRAN IV (CDC)), 8:24135 (R:US)

TVENT; ventilation system transient analysis (CDC7600;IBM360,370; FORTRAN IV), 8:24089 (R:US)

U Codes

UDAD; uranium dispersion & dosimetry model (IBM370,303x; FORTRAN IV (94%), PLL/I (4%), and Assembly language (2%). The only use of PL/I is the auxiliary plotting program, CONTOUR. The only use of Assembly language is the DATE, Gregorian calendar date routine), 8:23187 (R:US)

V Codes

VARR2; CRBRP 2-dimensional transient fluid flow analysis (CDC7600; FORTRAN IV and COMPASS), 8:23509 (R:US)

VIVAS2; A-BC exact coupled channel scattering (DEC VAX11/780; FORTRAN 77), 8:24513 (R:US)

W Codes

Computer control of electrochemical experiments with application to zinc/nickel oxide cells (REAL-TIME and WATCHDOG codes), 8:23679 (R:US)

WHTM; Wisconsin hydrologic transport model (IBM360,370; FORTRAN IV (96%) and Assembler (4%)), 8:24277 (R:US)

X Codes

XERROR; Fortran library error-handling package (CDC7600,6600,CYBER175 (designed to be machine-independent); FORTRAN 66 and FORTRAN 77), 8:25263 (R:US)

XOQDOQ; nuclear power plant effluent releases (IBM370,303x; FORTRAN IV), 8:23572 (R:US)

Z Codes
ZONE; 2-dimensional finite element mesh generator (CDC7600; FORTRAN), 8:25235 (R:US)
COMPUTER GRAPHICS
Guide to MAPPER presentation graphics, 8:25275 (R:US)
SLIC; interactive graphics 3-d mesh generation (CDC7600; FORTRAN IV (99%) and COMPASS (1%)), 8:25259 (R:US)
Computer Codes
QUIKIE: a plotting routine to produce quick and easy graphs. Reference manual, 8:25279 (R:US)
COMPUTER NETWORKS
NJE; VAX-VMS IBM NJE network protocol emulator (DEC VAX11/780; VAX-11 FORTRAN 77 (99%) and MACRO-11 (1%)), 8:25260 (R:US)
Data Acquisition
Hardware developments, 8:25272 (RA:DE:In German)
Data Transmission
IBM NJE protocol emulator for VAX/VMS, 8:25266 (R:US)
COMPUTER PROGRAMMING
See PROGRAMMING
COMPUTER PROGRAMS
See COMPUTER CODES
COMPUTERIZED CONTROL SYSTEMS
Design
System design of ZENKEI, the central control system for JT-60, 8:25177 (J:US)
Optimization
Optimization of sequential control in operation of fusion device, 8:25180 (J:US)
Programming
Software requirements of the central control system computer for the TEXT tokamak, 8:25186 (J:US)
COMPUTERS
Procurement
Costly delays in the purchase of a scientific computer for the Solar Energy Research Institute, 8:25227 (R:US)
CONCENTRATING COLLECTORS
See also TOWER FOCUS COLLECTORS
Bibliographies
Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975, 8:23323 (R:US)
CONCRETES
See also PRESTRESSED CONCRETE
REINFORCED CONCRETE
Creep
Thermal/strain history effects on creep of refractory concrete, 8:22938 (J:US)
Curing
Effect of curing condition on the concrete moisture retention and its shielding implication for the design of fusion facilities, 8:24924 (J:US)
Mechanical Properties
Shaped-charge penetration in concrete: a unified approach, 8:24218 (R:US)
Radiation Effects
FUETAP concrete - an alternative radioactive waste host, 8:23131 (RA:DE)
Temperature Effects
Thermomechanical behavior of refractory concrete linings, 8:22939 (J:US)
Thermal Degradation
FUETAP concrete - an alternative radioactive waste host, 8:23131 (RA:DE)
CONDENSERS
Corrosion
Sulfide attack in steam surface condensers, 8:23896 (RA:US)
CONDUCTIVITY (THERMAL)
See THERMAL CONDUCTIVITY
CONFERENCES
See MEETINGS
CONFIGURATION MIXING
CP Invariance
Perspectives on weak interactions, 8:24579 (RA:US)
CONGENITAL MALFORMATIONS
Pathogenesis
Ebb and flow of manganese: a possible pathogenic factor in birth defects, cancer and heart disease, 8:24457 (J:US)
CONSERVATION (ENERGY)
See ENERGY CONSERVATION
CONSOLES
Human Factors Engineering
Using cognitive modeling to improve the man-machine interface (PWR), 8:23561 (RA:US)
Visual momentum: an example of cognitive models applied to interface design, 8:23560 (RA:US)
CONSTRUCTION
Manpower
Overview of boom towns and construction efficiency interactions, 8:23697 (R:US)
Productivity
Overview of boom towns and construction efficiency interactions, 8:23697 (R:US)
CONSTRUCTIVE FIELD THEORY
Finite Element Method
Finite element approximation in quantum field theory, 8:24633 (J:NL)
CONSULTANTS
Contract Management
Administration of selected support-service contracts, 8:25226 (R:US)
CONTACT RADIOTHERAPY
See RADIOTHERAPY
CONTACTORS
See SWITCHES
CONTAINERS
See also CAPSULES
CASKS
PRESSURE VESSELS
REACTOR VESSELS
TANKS
Design
Design and testing of the TX-4 Type A container for packaging radioactive waste, 8:24114 (R:US)
Testing
Design and testing of the TX-4 Type A container for packaging radioactive waste, 8:24114 (R:US)
CONTAINMENT BUILDINGS
Impact Shock
Windfield and trajectory models for tornado-propelled objects. Final report, 8:23614 (R:US)
Impact Strength
Scale modeling of turbine-missile impact into concrete. Final report (PWR), 8:23611 (R:US)
Windfield and trajectory models for tornado-propelled objects. Final report, 8:23614 (R:US)
Performance Testing
Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory (LMFBR), 8:23595 (R:US)
CONTAINMENT SHELLS
Missile Protection
Full-scale turbine-missile concrete impact experiments. Final report, 8:23610 (R:US)
Stress Analysis
Buckling investigation of ring-stiffened cylindrical shells with reinforced openings under unsymmetrical axial loads, 8:23551 (R:US)
CONTAINMENT SYSTEMS
Computerized Simulation
CONTEMPT4/MOD2; multicompartment containment (CDC7600; FORTRAN IV (96%) and COMPASS (4%)), 8:23584 (R:US)
Filters
CHART; iodine decay heat on charcoal adsorbers (IBM360,370,303x; FORTRAN IV), 8:23583 (R:US)
Test Facilities
Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5 (LMFBR), 8:23617 (R:US)
CONTAMINATION (SURFACE)
See SURFACE CONTAMINATION

CONTINENTAL SHELF
Energy Models
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications, 8:23013 (R:US)
Natural Gas Deposits
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications, 8:23013 (R:US)
Petroleum Deposits
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications, 8:23013 (R:US)
CONTINUOUS MINERS
Data Acquisition Systems
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R:US)
Information
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R:US)
Measuring Instruments
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R:US)
CONTRACT ADMINISTRATION
See CONTRACT MANAGEMENT
CONTRACT MANAGEMENT
Prior to March 1983 this concept was indexed to PROGRAM MANAGEMENT.
Evaluation
Administration of selected support-service contracts, 8:25226 (R:US)
CONTRACTOR PERSONNEL
Accountability
Five-megawatt geothermal-power pilot-plant project, 8:23375 (R:US)
Management
Project management in the oil shale program, 8:23078 (R:US)
Performance
Performance accountability in the biomass energy systems program, 8:23254 (R:US)
CONTRACTS
See also FIXED-PRICE CONTRACTS
Cost Overruns
Administration of selected support-service contracts, 8:25226 (R:US)
Program Management
Alleged improprieties concerning the settlement of overcharge violations against the Tauber Oil Company, 8:23043 (R:US)
CONTROL (RADIOACTIVITY)
See RADIATION MONITORING
CONTROL ROOMS
Alarm Systems
Automatic diagnosis of multiple alarms for reactor control rooms, 8:23639 (J:US)
Human Factors Engineering
Tables of cross references among SECY 82-111, NUREG 0700, NUREG 0835, NUREG 0801, 8:23569 (R:US)
Technical issues related to NUREG 0800, Chapter 18: Human Factors Engineering/Standard Review Plan, 8:23531 (R:US)
Reactor Control Systems
Automatic diagnosis of multiple alarms for reactor control rooms, 8:23639 (J:US)
CONTROL SYSTEMS
For automated processes including feedback.
See also COMPUTERIZED CONTROL SYSTEMS
REACTOR CONTROL SYSTEMS
CLAP; linear control system design analysis (Commodore PET with IEEE 488 Bus interface and peripherals; BASIC), 8:24100 (R:US)
Design
Design concept of real-time plasma control for JT-60, 8:25179 (J:US)
Feedback
Experimental study on feedback control system of plasma position, 8:25181 (J:US)
CONTROL THEORY (REACTOR)
See REACTOR KINETICS
CONVEYORS
Surface Coating
Development of noise-abatement aids in underground mining operations, 8:22970 (R:DE:In German)
COOLANTS
See also specific coolant materials.
Mixing
Three-dimensional modeling of thermal and fluid mixing in PWRs during high-pressure coolant injection, 8:23640 (J:US)
COOLERS
See HEAT EXCHANGERS
COOLING LOAD
Computer Codes
DOE2.1A; building energy consumption analysis (CDC7600,6600,CYBER175;IBM370,303x;DEC10,20; FORTRAN (99.9%) and COMPASS (0.1%) for the CDC version. The IBM and DEC versions are all FORTRAN.), 8:23794 (R:US)
COOLING SYSTEM (REACTOR)
See REACTOR COOLING SYSTEMS
COOLING SYSTEMS
See also REACTOR COOLING SYSTEMS
THERMONUCLEAR REACTOR COOLING SYSTEMS
Environmental Effects
Review of the effects of the Clean Water Act on cooling-system selection by the steam-electric industry, 8:23427 (R:US)
Intake Structures
Advanced intake technology for cooling-water intakes: current status and future direction, 8:23409 (R:US)
Performance
Review of the effects of the Clean Water Act on cooling-system selection by the steam-electric industry, 8:23427 (R:US)
COOLING TOWER PACKING GRIDS
See PACKINGS
COOLING TOWERS
Bacteria
Concentration, serotypic profiles, and infectivity of Legionnaires' Disease bacteria populations in cooling towers, 8:24349 (R:US)
Computerized Simulation
DRIFT; cooling tower drift eliminator analysis (IBM370,303x; FORTRAN IV), 8:23399 (R:US)
Optimization
BECKDRY; dry cooling for steam-electric plants (CDC6600,7600; FORTRAN IV), 8:23398 (R:US)
COOLING WATER CHEMICAL TREATMENT
See WATER CHEMISTRY
COPAIBA
See COPAIFERA
COPAIFERA
Plant Breeding
New sources for fuel and materials, 8:23282 (J:US)
COPPER
Antiproton Reactions
Effects of strong attraction in antiproton-nucleus scattering, 8:24621 (RA:US)
Biological Effects
Cadmium-copper interaction: tissue accumulation and subcellular distribution of cadmium in mice after simultaneous administration of cadmium and copper, 8:24471 (J:US)
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Serum copper, follicular stimulating hormone, luteinizing hormone, prolactin, spermatic count, viability, progression and seminal zinc correlations in a human (male) infertility study, 8:24472 (J:US)
Corrosion
Corrosion problems associated with solar fluid and components, 8:23315 (R:US)
Corrosion Fatigue
Environmental effects on fatigue crack initiation and early propagation, 8:23907 (RA:US)

Corrosion Protection
Surface enhanced Raman scattering in corrosion science: benzotriazole on copper, 8:23987 (J:US)
Crack Propagation
Environmental effects on fatigue crack initiation and early propagation, 8:23907 (RA:US)
Displacement Rates
Molecular-dynamics simulation of displacement cascades in Cu: analysis of replacement sequences, 8:23934 (R:US)
Ecological Concentration
Environmental pollution control at the AMAX-Homestake lead smelter, 8:24245 (J:US)
Heavy metals in the environs of a smelter, 8:24292 (J:US)
Electric Conductivity
Temperature dependence of electrical resistivity of vanadium, platinum and copper, 8:23978 (J:US)
Electron Diffraction
Chemisorption of oxygen on Cu(110) studied by eels and leed, 8:24744 (J:NL)
Fermi Level
Installation of a positron annihilation apparatus for the investigation of Fermi surfaces, 8:24725 (R:DE:In German)
Mechanical Properties
Surface segregation in binary alloy first wall candidate materials, 8:24904 (J:NL)
Metabolism
Analytical measurements of selected metals in samples from a human metabolic study, 8:24473 (J:US)
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Serum copper, follicular stimulating hormone, luteinizing hormone, prolactin, spermatic count, viability, progression and seminal zinc correlations in a human (male) infertility study, 8:24472 (J:US)
Physical Radiation Effects
Molecular-dynamics simulation of displacement cascades in Cu: analysis of replacement sequences, 8:23934 (R:US)
Re-examination of the threshold energy surface in copper, 8:23935 (R:US)
Threshold energy surface and Frenkel-pair resistivity for Cu, 8:23948 (R:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Sorptive Properties
Chemisorption of oxygen on Cu(110) studied by eels and leed, 8:24744 (J:NL)
Superconductivity
Specific heat of in situ superconducting composites, 8:23973 (J:US)
Surface Properties
Normal photoelectron diffraction of O/Cu(001): A surface-structural determination, 8:23981 (J:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)

COPPER ALLOYS
See also COPPER BASE ALLOYS
Corrosion
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
Sea water corrosion of two-phase Cu-10Ni-8Sn, 8:23897 (RA:US)
Sulfide attack in steam surface condensers, 8:23896 (RA:US)
Physical Radiation Effects
Radiation damage in amorphous CuZr-alloys, 8:23965 (RA:DE:In German)
Surface segregation in concentrated Ni-Cu alloys under irradiation (Ni-10Cu; Ni-60Cu), 8:23943 (R:US)
Superconductivity
Specific heat of in situ superconducting composites, 8:23973 (J:US)

COPPER BASE ALLOYS
See also BRASS
Physical Radiation Effects
Surface segregation in concentrated Ni-Cu alloys under irradiation (Ni-10Cu; Ni-60Cu), 8:23943 (R:US)
Sputtering
Ion-bombardment-induced subsurface composition modifications in alloys at elevated temperatures (Cu - 40 at. % Ni), 8:23932 (R:US)

COPPER IODIDES
Crystal-Phase Transformations
Molecular dynamics studies of superionic conductors, 8:24031 (R:US)
Ionic Conductivity
Molecular dynamics studies of superionic conductors, 8:24031 (R:US)

COPPER IONS
Ecological Concentration
Effects of copper speciation on aquatic ecosystems, 8:23429 (R:US)
Toxicity
Effects of copper speciation on aquatic ecosystems, 8:23429 (R:US)

COPPER ORES
Solution Mining
In-place leaching of uranium, copper, and evaporites, 8:23101 (R:US)

COPPER OXIDES
Chemical Reactions
Simultaneous removal of SO_3 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R:US)
Regeneration
Simultaneous removal of SO_3 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R:US)
Sorptive Properties
Simultaneous removal of SO_3 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R:US)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program, 8:23782 (R:US)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program, 8:23781 (R:US)

CORE BARREL
See CORING EQUIPMENT

CORE CATCHERS
Performance Testing
Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory (LMFBR), 8:23595 (R:US)

CORES (DRILL)
See DRILL CORES

CORES (REACTOR)
See REACTOR CORES

CORING EQUIPMENT
Design
Method and apparatus for recovering unstable cores, 8:23020 (P:US)

CORN (MAIZE)
See MAIZE

CORN STOVER
See AGRICULTURAL WASTES
MAIZE

CORROSION
Meetings
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)

CORROSION INHIBITORS
Infrared Spectra
Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces, 8:23901 (RA:US)
Raman Spectra
Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces, 8:23901 (RA:US)

COST OVERRUNS
Administration of selected support-service contracts, 8:25226 (R:US)

COUNTERFLOW COOLING TOWERS
See COOLING TOWERS
COUNTY BUILDINGS
See PUBLIC BUILDINGS
COURT BUILDINGS
See PUBLIC BUILDINGS
COVERINGS
Design
Design surface covers: an approach to long-term waste site stabilization, 8:23172 (R:US)
CP INVARIANCE
Unified Gauge Models
Status of theories of CP non-invariance, 8:24631 (R:US)
CRACK GROWTH
See CRACK PROPAGATION
CRACK PROPAGATION
Environmental variables and stress corrosion crack propagation rates, 8:23908 (RA:US)
Mathematical Models
Fatigue crack growth in aqueous and gaseous environments, 8:23903 (RA:US)
Stress corrosion cracking: a continuum formulation, 8:23929 (RA:US)
CREDITS
See FINANCIAL DATA
CREEKS
See STREAMS
CRESOLS
Mutagen Screening
Use of the mouse heritable translocation test in testing chemicals (Ammoniated glycerrhizin; butylated hydroxytoluene; gum arabic; ethylene oxide), 8:24430 (RA:US)
Toxicity
Systemic toxicology, 8:24442 (RA:US)
CRESYLIC ACID
See CRESOLS
CRITICAL ASSEMBLIES
See ZERO POWER REACTORS
CRITICALITY
Bibliographies
Nuclear criticality safety experiments, calculations, and analyses: 1958 to 1982. Volume 1. Lookup tables, 8:23544 (R:US)
Nuclear criticality safety experiments, calculations, and analyses - 1958 to 1982. Volume 2. Summaries. Compliilation of papers from the Transactions of the American Nuclear Society, 8:23545 (R:US)
CRITICALITY ACCIDENTS
See CRITICALITY
RADIATION ACCIDENTS
CROPS
Biological Effects
Oxidant air pollution: estimating economic effects on US vegetation. Paper 81.2.2, 8:24306 (J:US)
Economics
Oxidant air pollution: estimating economic effects on US vegetation. Paper 81.2.2, 8:24306 (J:US)
CROSSFLOW COOLING TOWERS
See COOLING TOWERS
CRUDE OIL
See PETROLEUM
CRUSTACEANS
DNA-Cloning
Structure and organization of the eukaryotic genome with special emphasis on satellite DNAs, 8:24317 (RA:US)
Melting
Structure and organization of the eukaryotic genome with special emphasis on satellite DNAs, 8:24317 (RA:US)
CRYOBIOLOGY
Theoretical and applied cryobiology, 8:24397 (RA:US)
CRYOPUMPS
Design
Cryopumps for JET - design of a large scale system of open configuration for high specific pumping speed, 8:25203 (J:US)
CRYSTAL LATTICES
Diffusion
Chemical diffusion in a one dimensional lattice with two sites inequivalent, 8:24045 (J:GB)
CRYSTALLOGRAPHY
Mathematical Models
Temperature dependence of dispersive hopping transport and diffusion in disordered solids, 8:24067 (J:GB)
CRYSTALS
See also LIQUID CRYSTALS
Electron Channeling
Coherent absorption and emission processes of energetic particles penetrating crystals, 8:24731 (BA:US)
Electron-channeling radiation: x-ray source feasibility study, 8:24729 (R:US)
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
Ion Channeling
Coherent absorption and emission processes of energetic particles penetrating crystals, 8:24731 (BA:US)
Positron Channeling
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
Surface Properties
Imaging and analysis of surfaces using diffracted electrons, 8:24068 (BA:US)
CS-R PROCESS
The CS/R process, 8:22903 (RA:CA)
Pilot Plants
Overview of coal liquefaction in the US Department of Energy, 8:22917 (R:US)
CURIUM
Inventories
Byproduct inventories, 8:23171 (R:US)
CURRENT-DRIVE HEATING
Driver options for steady-state tokamak reactors, 8:25079 (J:US)
Lower hybrid heating and current drive on PLT, 8:24766 (R:US)
Operating tokamaks with steady-state toroidal current, 8:24765 (R:US)
Some novel features of the ordinary-mode electron-cyclotron resonance heating of tokamak plasmas, 8:24771 (R:US)
Computer Calculations
Ray-tracing study of electron-cyclotron heating in toroidal geometry, 8:24767 (R:US)
CURTAILMENTS
See ALLOCATIONS
CYCLIC ADENOSINE MONOPHOSPHATE
See AMP
CYCLOALKANES
See also CYCLOHEXANE
Toxicity
Cytotoxicity of fossil fuel related pure compounds and complex mixtures, 8:24420 (RA:US)
CYCLOHEXANE
Pyrolysis
Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels. Progress report, February 16, 1982-February 15, 1983, 8:24082 (R:US)
CYCLONE SEPARATORS
Performance
Dense-medium cycloning of fine coal at low specific gravities, 8:22987 (R:US)
CYCLOPHOSPHAMIDE
See ENDOXAN
CYCLOTRONS
Remote Handling Equipment
Remote target removal for the Oak Ridge 86-in. cyclotron, 8:24191 (J:US)
CYTOSTATICS
See ANTIMITOTIC DRUGS

CYTOTOXINS
See ANTIMITOTIC DRUGS

D

DATA ACQUISITION
Administrative Procedures
Directory of Energy Data Collection Forms, 8:23691 (R:US)
Directories
Directory of Energy Data Collection Forms, 8:23691 (R:US)
DATA ACQUISITION SYSTEMS
Computer control and data acquisition for neutral-beam injectors, 8:24829 (R:US)
Design
Data acquisition system of TFR tokamak experiment, 8:25192 (J:US)
High speed digital data acquisition system on Alcator, 8:25193 (J:US)
Small CAMAC-based data acquisition system, 8:25191 (J:US)
Field Tests
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)
Manuals
Duty-cycle investigations of continuous miners. Volume II. Instrument manual, 8:22975 (R:US)
Memory Devices
Stored-data acquisition system, 8:25278 (R:US)
Performance Testing
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)
Recommendations
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)
Specifications
Duty-cycle investigations of continuous miners. Volume II. Instrument manual, 8:22975 (R:US)
DATA ANALYSIS
Computer Codes
DENDRO; hierarchical cluster analysis of data (IBM360,370; FORTRAN IV (98%) and Assembly language (2%)), 8:25255 (R:US)
DATA BASE MANAGEMENT
Organization and structure of an EPRI DATATRAN data bank, 8:23613 (R:US)
DATA PROCESSING
Manipulation of unit facts.
Pade Approximation
Analytically solvable examples of account for instrumental resolution with the Pade approximation of resonance curves, 8:25274 (RA:SU:In Russian)
DAYLIGHTING
Computer Calculations
Preliminary daylighting studies for incorporation into DEROB, 8:23807 (RA:US)
Research Programs
Solar Energy Research Institute's daylighting laboratory, 8:23827 (R:US)
DC AMPLIFIERS
Design
Low noise, high impedance, dc coupled auto zeroing amplifier for TFTR, 8:25189 (J:US)
DC SYSTEMS
Limiter Circuits
Development of a dc current limiting interrupting system for mines. Open file report Jun 79-Sep 81, 8:24109 (R:US)
DEAD SEA
Mathematical Models
Halo-thermal simulation of the Dead Sea, 8:24503 (R:IL)
DEBITS
See FINANCIAL DATA
DECAY HEAT REMOVAL
See AFTER-HEAT REMOVAL
DECIMETER WAVE RADIATION (1-3 DM)
See RADIOWAVE RADIATION
DECIMETER WAVE RADIATION (3-10DM)
See RADIOWAVE RADIATION
DECLASSIFICATION
Errors
Public access to classified reports at the Los Alamos Scientific Laboratory, 8:25282 (R:US)
DEEP INELASTIC HEAVY ION REACTIONS
Role of M1 transitions in the quasicontinuum, 8:24672 (R:US)
Alpha-Transfer Reactions
Cluster transfer in damped collisions between heavy ions, 8:24707 (RA:DE:In German, English)
Fokker-Planck Equation
Dynamical coupling of relative motion, deformations and charge transfer within a Fokker-Planck equation for deep inleastic collisions, 8:24682 (RA:DE:In German, English)
Nuclear Models
Surface friction model of deep inelastic collisions and capture, 8:24706 (RA:DE:In German, English)
Stochastic Processes
Interplay between coherent and stochastic effects in deep inelastic collisions of heavy ions, 8:24708 (RA:DE:In German, English)
DEFORMATION
Initiation and development of deformation heterogeneities in superplastic materials, 8:24739 (R:US)
DEHPA
See PHOSPHONIC ACID ESTERS
DEMONSTRATION PROGRAMS
Information Dissemination
Dissemination of technical information from the oil-shale program, 8:23079 (R:US)
DENDRITIC WEB GROWTH METHOD
Research Programs
Large-area sheet task: advanced dendritic-web-growth development. Annual report, October 23, 1981-October 22, 1982 (RIBBON), 8:23267 (R:US)
DENITRIFICATION
Catalysts
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Electron Beams
DOE's electron-beam-irradiation development program (Avco/EBARA (E-beam/ammonia) Process; Research-Cottrell (E-beam/lime slurry) process), 8:22954 (R:US)
DENSITOMETERS
Calibration
Radiographic screen-film noise power spectrum: calibration and intercomparison, 8:24210 (J:US)
DENTISTRY
Microradiography
An overview of dental radiology: a primer on dental radiology, 8:24390 (R:US)
DEOXYCYTIDINURIA
See URINE
DEOXYPENTOSE NUCLEIC ACID
See DNA
DEOXYRIBONUCLEIC ACID
See DNA
DEPLETED URANIUM
Recycling
Depleted uranium test range fragment reclamation. Final report Nov 81-Jun 82, 8:23104 (R:US)
DEPLETION (ISOTOPIC)
See ISOTOPE SEPARATION
DEPLETION (NUCLEAR FUELS)
See BURNUP
DEPOSITION
For the laying down of a substance on a surface; for deposition of elements and nuclides in tissues of living organisms use RETENTION.
Mathematical Models
Wet and dry surface deposition of air pollutants and their modeling, 8:24230 (R:US)

DEREGULATION
Economic Impact
Mergers in the petroleum industry: report of the Federal Trade Commission, 8:23036 (R:US)
DESALINATION PLANTS
Optimization
MSF21;VTE21; desalination plant optimization (IBM360,370; FORTRAN (97%) and BAL (3%)), 8:24088 (R:US)
RO75; reverse osmosis desalting plant design (IBM360,370,303x; FORTRAN IV (92%) and Assembly language (8%)), 8:24093 (R:US)
DESOXYRIBONUCLEIC ACID
See DNA
DESULFURIZATION
Catalysts
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Electron Beams
DOE's electron-beam-irradiation development program (Avco/EBARA (E-beam/ammonia) Process; Research-Cottrell (E-beam/lime slurry) process), 8:22954 (R:US)
Information Systems
Flue gas desulfurization information system data base user's manual, 8:24241 (R:US)
DETECTION (FAILED ELEMENT)
See FAILED ELEMENT DETECTION
DETECTION (NUCLEAR EXPLOSIONS)
See NUCLEAR EXPLOSION DETECTION
DETECTION (SEISMIC)
See SEISMIC DETECTION
DETONATORS
Testing
Velocity perturbation of a flyer approaching a rigid impermeable barrier and the transmitted pressure pulse, 8:24214 (R:US)
DEUTERIUM
Atom-Molecule Collisions
Applications of classical trajectory techniques to reactive scattering, 8:24566 (J:US)
Isotope Effects
NMR study of phase transitions in VT/sub 0.50/ and VT/sub 0.75/, 8:24010 (J:US)
Small-angle neutron scattering studies of a compatible polymer blend, atactic polystyrene-poly(2,6 dimethyl phenylene oxide), 8:24073 (J:GB)
Microanalysis
DAP; deuterium depth profile in uniform solids (IBM303x; FORTRAN IV), 8:23993 (R:US)
Trapping
Deuterium trapping in low-Z coatings, 8:24898 (J:NL)
DEUTERIUM COMPOUNDS
Photoelectron Spectroscopy
Laser photoelectron spectroscopy of ions. Progress report, August 1, 1982-July 31, 1983, 8:24527 (R:US)
DEUTERIUM HYDRIDE
See HYDROGEN DEUTERIDE
DEUTERIUM IONS
Ion-Molecule Collisions
Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982, 8:24522 (R:US)
DEUTERIUM OXIDES
See HEAVY WATER
DEUTERIUM-LITHIUM HIGH FLUX NEUTRON SOURC
See NEUTRON SOURCE FACILITIES
DEVELOPED COUNTRIES
Economic Analysis
Energy security in the industrial nations, 8:23723 (R:US)
Energy Policy
Energy security in the industrial nations, 8:23723 (R:US)
DEVICES
See EQUIPMENT
DEVONIAN SHALES
See BLACK SHALES
DIAL PAINTERS
Biological Radiation Effects
Radium dial workers, 8:24364 (R:US)
DIALYSIS
Side Effects
Release of zinc from disposable coils during hemodialysis, 8:24345 (J:US)
DIAMOND DRILLING EQUIPMENT
See DRILLING EQUIPMENT
DIAMONDS
Electron Channeling
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
Positron Channeling
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
Surface Properties
Imaging and analysis of surfaces using diffracted electrons, 8:24068 (BA:US)
DIAPHRAGMS (THERMONUCLEAR DEVICE)
See LIMITERS
DIATOMS
Population Dynamics
Temporal trends in the pH of Woods, Sagamore, and Panther Lakes as determined by an analysis of diatom population, 8:24287 (RA:US)
DIBARYON RESONANCES
Mathematical Models
I=1 dibaryons - theoretical, 8:24610 (RA:US)
Particle Production
Experimental evidence for dibaryons, 8:24589 (RA:US)
DIELECTRIC MATERIALS
Kapitza Resistance
Kapitza thermal boundary resistance between two solids, 8:24746 (BA:US)
DIELECTRIC TRACK DETECTORS
Calibration
Solid state nuclear track detectors (SSNTD), 8:24201 (RA:DE:In German)
DIELECTRICS
See DIELECTRIC MATERIALS
DIESEL ENGINES
Ethanol Fuels
Effect of low-proof alcohol utilization to supplement diesel fuel on engines life expectancy: Caterpillar 3306 PCI. Final report, 8:23880 (R:US)
Effect of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: International Harvester D436. Final report, 8:23881 (R:US)
Effects of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: John Deere 6466T. Final report, 8:23879 (R:US)
Exhaust Gases
Mutagenicity of diesel exhaust particle extracts: influence of driving cycle and environmental temperature, 8:24456 (J:US)
Fuel Substitution
Microemulsions from vegetable oil and aqueous alcohol with 1-butanol surfactant as alternative fuel for diesel engines, 8:23239 (P:US)
Performance
Effect of low-proof alcohol utilization to supplement diesel fuel on engines life expectancy: Caterpillar 3306 PCI. Final report, 8:23880 (R:US)
Effect of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: International Harvester D436. Final report, 8:23881 (R:US)
Effects of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: John Deere 6466T. Final report, 8:23879 (R:US)
Wear
Effect of low-proof alcohol utilization to supplement diesel fuel on engines life expectancy: Caterpillar 3306 PCI. Final report, 8:23880 (R:US)
Effect of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: International Harvester D436. Final report, 8:23881 (R:US)

Effects of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: John Deere 6466T. Final report, 8:23879 (R:US)

DIESEL FUELS

Chemical Properties

Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)

Fuel Additives

Effect of low-proof alcohol utilization to supplement diesel fuel on engines life expectancy: Caterpillar 3306 PCI. Final report, 8:23880 (R:US)

Effect of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: International Harvester D436. Final report, 8:23881 (R:US)

Effects of low-proof alcohol utilization to supplement diesel fuel on engine life expectancy: John Deere 6466T. Final report, 8:23879 (R:US)

Fuel Supplies

Transportation energy contingency planning: transit fuel supplies under decontrol, 8:23715 (R:US)

Physical Properties

Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)

Toxicity

Inhalation toxicology, 8:24445 (RA:US)

DIESEL OIL (FRACTION)

See DIESEL FUELS

DIFFERENTIAL EQUATIONS

See also PARTIAL DIFFERENTIAL EQUATIONS

Extrapolation

Efficient extrapolation methods for ODEs, 8:25277 (R:US)

DIFFRACTION (NEUTRON)

See NEUTRON DIFFRACTION

DIFFRACTION (X-RAY)

See X-RAY DIFFRACTION

DIFFUSION

Mathematical Models

Two-dimensional dynamical drainage-flow model with Monte Carlo transport and diffusion calculations, 8:24234 (R:US)

Numerical Solution

Chemical diffusion in a one dimensional lattice with two sites inequivalent, 8:24045 (J:GB)

DIFFUSION WELDING

Technology Assessment

Possibilities of welding as a joining process in airframe construction, 8:24130 (TJ:US)

DIGITALIS GLYCOSIDES

Biological Effects

Zinc and magnesium concentrations in plasma and red blood cells in patients on digitalis medication, 8:24462 (J:US)

DIMETHYLBENZANTHRACENE

Biological Effects

Induction and progression of neoplasia in tracheal epithelium, 8:24443 (RA:US)

Normal and neoplastic growth in epithelial cells, 8:24444 (RA:US)

Toxicity

Cytometrics, 8:24450 (RA:US)

DIOLS

See GLYCOLS

DIPOLES

Detection

Locating a buried magnetic dipole, 8:24155 (J:US)

DIRAC COSMOLOGY

Gravitation

Dirac's large number hypothesis and the red shifts of distant galaxies, 8:24506 (R:XA)

Reliability

Do neutron stars disprove multiplicative creation in Dirac's large number hypothesis, 8:24505 (R:XA)

DIRECT ENERGY CONVERTERS

See also MHD GENERATORS
THERMIONIC CONVERTERS
THERMOELECTRIC GENERATORS
THERMOPHOTOVOLTAIC CONVERTERS

Direct energy converter for UW tandem mirror reactor, 8:25134 (J:US)

DIRECT GAIN SYSTEMS

Prior to September 1980 HEAT GAIN was used to index this concept.

Performance

Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979, 8:23337 (R:US)

Solar-energy-system performance evaluation: Hullco Construction Company single-family residence, Prescott, Arizona, May 1978-April 1979, 8:23334 (R:US)

Solar-energy-system performance evaluation: Living Systems single-family residence, Davis, California, October 1978-March 1979, 8:23336 (R:US)

DIRICHLET PROBLEM

Numerical Solution

DPOLE; helmholtz equation on general 3-dimensional region (CDC6600,7600; FORTRAN IV, FTN 4.6+460 compiler), 8:25246 (R:US)

DISCHARGES (WASTES)

See WASTE DISPOSAL

DISINTEGRATION (FISSION)

See FISSION

DISPERSANTS (CHEMICAL)

See SURFACTANTS

DISPERSION NUCLEAR FUELS

Measuring Methods

Role of fuel power in HCDA early fuel dispersal, 8:23650 (J:US)

DISPOSAL (WASTES)

See WASTE DISPOSAL

DISSOLVED MATERIALS

See SOLUTES

DISSOLVED OXYGEN

See OXYGEN

DISTILLATE FUEL

See HEATING OILS

DISTILLATE FUEL OIL

See HEATING OILS

DISTRIBUTED COLLECTOR POWER PLANTS

Demonstration Programs

Solar Total-Energy Project, Shenandoah, Georgia site. Annual technical progress report, July 1, 1980-June 30, 1982, 8:23301 (R:US)

DISTRICT HEATING

See also GEOTHERMAL DISTRICT HEATING

Design

Assessment of European district-heating technology, 8:23702 (R:US)

Technology Assessment

Assessment of European district-heating technology, 8:23702 (R:US)

DIVERTORS

See also PDX DEVICES
POLOIDAL DIVERTORS

RF divertor principle study in the TFR plasmas, 8:24861 (J:NL)

Design

Mechanical design of a toroidal divertor for EBT-S, 8:24984 (J:US)

Efficiency

Divertor efficiency in ASDEX, 8:24863 (J:NL)

Erosion

Erosion and redeposition analysis for limiter and divertor impurity control systems, 8:24878 (J:NL)

Flow Models

Plasma motion and purification in an ergodic divertor, 8:24871 (J:NL)

Theoretical model for hot plasma flowing to a wall with recycling, 8:24870 (J:NL)

Heat Transfer

Neutral gas blanket effects in a gaseous divertor, 8:24858 (J:NL)

Performance
Divertors and impurity control: where we stand, where we have to go, 8:24867 (J:NL)
Simulation
Monte Carlo simulation of the neutral gas density and temperature distribution due to the recycling processes at a poloidal, toroidal or mushroom limiter and at the divertor plate of a poloidal divertor, 8:24874 (J:NL)
Targets
Thermal and structural analysis of solid divertor targets for e-beam testing, 8:25209 (J:US)
Thermal Stresses
Thermal and structural analysis of solid divertor targets for e-beam testing, 8:25209 (J:US)

DMBA
See DIMETHYLBENZANTHRACENE

DNA
Alkylation
Molecular dosimetry of ethylene oxide in the mouse, 8:24436 (RA:US)
Biological Radiation Effects
Immunological detection of two types of cyclobutane pyrimidine dimers in DNA, 8:24392 (J:US)
Biological Repair
DNA repair in human cells, 8:24417 (RA:US)
DNA repair studies in mammalian germ cells, 8:24433 (RA:US)
Excision repair of DNA damage. III. The regulation of excision repair. Oncology overview, 8:24322 (R:US)
Genetic analysis of DNA repair in man with cell hybrids (Ultraviolet radiation), 8:24377 (RA:US)
Genetic dissection of DNA repair in xeroderma pigmentosum cells (Ultraviolet radiation), 8:24378 (RA:US)
Genetics of repair of radiation damage to DNA in bacteria, 8:24381 (RA:US)
Mechanisms of mutagenesis and DNA repair, 8:24311 (RA:US)
Microbial mutagenesis and cell division (Ionizing radiation), 8:24380 (RA:US)
Structural aspects of DNA in its replication and repair, 8:24310 (RA:US)
Biosynthesis
Inhalation mutagenesis of ethylene oxide: unscheduled DNA synthesis and dominant lethal effects, 8:24435 (RA:US)
Genetic Mapping
Structure and organization of the eukaryotic genome with special emphasis on satellite DNAs, 8:24317 (RA:US)
Measuring Methods
High resolution DNA content measurements of mammalian sperm, 8:24327 (J:US)
Molecular Structure
Structural aspects of DNA in its replication and repair, 8:24310 (RA:US)
Oncogenic Transformations
Excision repair of DNA damage. III. The regulation of excision repair. Oncology overview, 8:24322 (R:US)
Strand Breaks
DNA damage in mammalian sperm assayed by alkaline elution, 8:24434 (RA:US)
Environmental insults to DNA, 8:24413 (RA:US)
Transcription
Control of transcription in animal viral systems, 8:24313 (RA:US)
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
X-Ray Diffraction
X-ray diffraction, 8:24318 (RA:US)

DNA REPLICATION
LTR-vectors, 8:24338 (P:US)
Polymerases
Correlation of structure and functions of proteins involved in phage T5 DNA replication: an approach to study of mutagenesis, 8:24314 (RA:US)

DOCUMENT DESTRUCTION
Legal Aspects
Investigation of questions of possible document destruction by the Office of Special Counsel for Compliance, 8:25225 (R:US)

DOCUMENT RETRIEVAL
See INFORMATION RETRIEVAL

DOLOMITE
Sorptive Properties
Exploratory and basic fluidized-bed combustion studies. Annual report, October 1980-September 1981, 8:24148 (R:US)

DOLPHINS
See CETACEANS

DORMITORIES
See RESIDENTIAL BUILDINGS

DOUBLET 3 DEVICES
See DOUBLET REACTORS

DOUBLET REACTORS
Control Systems
Computer control and data acquisition for neutral-beam injectors, 8:24829 (R:US)
Data Acquisition Systems
Computer control and data acquisition for neutral-beam injectors, 8:24829 (R:US)
Data Base Management
Status of Doublet III data archival and retrieval system, 8:25168 (J:US)
Design
Modification of Doublet III to a large dee facility, 8:24945 (J:US)
Divertors
High density, single-null poloidal divertor results in doublet III, 8:24866 (J:NL)
Review of the recent expanded boundary divertor experiments in the Doublet III device, 8:24865 (J:NL)
Limiters
Changes in limiter surface temperature profiles for small radius plasmas in Doublet III, 8:24896 (J:NL)
Modifications
Modification of Doublet III to a large dee facility, 8:24945 (J:US)
Neutral Beam Sources
Doublet III neutral beam power system, 8:25090 (J:US)
Magnetic shielding and eddy current effects measurements in a Doublet III neutral beam injector, 8:25091 (J:US)
Plasma Diagnostics
Laser-fluorescence measurements of hydrogen and metal densities in the Doublet III tokamak, 8:24763 (R:US)
Radiation Protection
Doublet III vessel wall protection for 7 MW neutral beam heated plasma operation, 8:24968 (J:US)
Shielding
Doublet III vessel wall protection for 7 MW neutral beam heated plasma operation, 8:24968 (J:US)
Stability
Stability of Doublet III plasmas against axisymmetric resistive MHD modes, 8:24913 (J:GB)

DRESDEN-2 REACTOR
Primary Coolant Circuits
Oxygen suppression in boiling-water reactors: Phase 2. Final report, 8:23447 (R:US)
Water Chemistry
Oxygen suppression in boiling-water reactors: Phase 2. Final report, 8:23447 (R:US)

DRIFT INSTABILITY
Saturation
Saturation of the lower-hybrid-drift instability by mode coupling, 8:24777 (J:US)

DRIFT (ION)
See ION DRIFT

DRILL BITS
Design
Analytical and experimental investigations of rock cutting using polycrystalline diamond compact drag cutters, 8:23028 (J:US)
Performance Testing
Analytical and experimental investigations of rock cutting using polycrystalline diamond compact drag cutters, 8:23028 (J:US)

DRILL CORES
Computer Graphics
SECTION.REV1; plot geochemical drill hole data (UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%)), 8:23379 (R:US)
Hydrocarbons
Method and apparatus for recovering unstable cores, 8:23020 (P:US)
Recovery
Method and apparatus for recovering unstable cores, 8:23020 (P:US)
Stabilization
Method and apparatus for recovering unstable cores, 8:23020 (P:US)
DRILL PIPES
Liners
Development of modifications for Coflexip flexible drilling pipe for high-temperature and -pressure geothermal service. Final report, 8:23383 (R:US)
Modifications
Development of modifications for Coflexip flexible drilling pipe for high-temperature and -pressure geothermal service. Final report, 8:23383 (R:US)
DRILL SHIPS
See OFFSHORE PLATFORMS
SHIPS
DRILLING EQUIPMENT
See also CORING EQUIPMENT
DRILL BITS
DRILL PIPES
Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries, 8:22977 (R:PL)
Operating Cost
Costs and indexes for domestic oil- and gas field equipment and production operations, 1982, 8:23017 (R:US)
DRILLING FLUIDS
Limited to materials used in well drilling.
Environmental Transport
Long-term simulation of sediment and contaminant transport, 8:24291 (R:US)
DRILLING MUD
See DRILLING FLUIDS
DRILLING PLATFORMS
See OFFSHORE PLATFORMS
DRINKING WATER
Chemical Composition
Problems associated with heavy metals in drinking water, 8:24463 (J:US)
Variations in drinking water quality and the possible effects on human health, 8:24299 (J:US)
Maximum Acceptable Contamination
Thoughts about revising the radiation regulations in drinking water concerned with natural radioactivity, 8:24353 (J:US)
Water Chemistry
Analysis of tapwater lead concentration in homes of children with undue body lead burden, 8:24300 (J:US)
DROPLETS
Evaporation
Experimental evaluation of mass transfer from sessile drops, 8:24138 (J:US)
Mass Transfer
Experimental evaluation of mass transfer from sessile drops, 8:24138 (J:US)
DROSOPHILA
Cytology
Drosophila cytology and genetics, 8:24329 (RA:US)
Enzyme Activity
Enzyme and gene regulation in Drosophila, 8:24412 (RA:US)
Genetics
Drosophila cytology and genetics, 8:24329 (RA:US)
Enzyme and gene regulation in Drosophila, 8:24412 (RA:US)
DRUM WALLS
Performance
Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979, 8:23337 (R:US)
DRY DEPOSITION
See DEPOSITION
DRY SCRUBBERS
Field Tests
Experimental evaluation of spray-dryer flue-gas desulfurization for use with Eastern US coals, 8:23428 (R:US)
Research Programs
Advanced environmental control technology , 8:22952 (R:US)
DRYERS
See also CLOTHES DRYERS
Energy Consumption
Commercial scale production of alfalfa leaf protein concentrate, 8:23869 (J:US)
Waste Heat Utilization
Commercial scale production of alfalfa leaf protein concentrate, 8:23869 (J:US)
DRYERS, CLOTHES
See CLOTHES DRYERS
DRY-TYPE COOLING TOWERS
See COOLING TOWERS
DTO
See DEUTERIUM COMPOUNDS
HEAVY WATER
TRITIUM COMPOUNDS
DUAL-FUEL ENGINES
Design
Gas generation of low b.t.u. fuel gas from agricultural residues. Final report, 8:23225 (R:US)
DUAL-PURPOSE POWER PLANTS
Site Selection
Cogeneration and emission offsets in nonattainment areas, 8:23700 (R:US)
Thermal Energy Storage Equipment
SOLTES1; thermal energy systems simulation (CDC6600,7600; FORTRAN IV (99%) and COMPASS (1%)), 8:23663 (R:US)
Thermionic Converters
Thermionic cogeneration burner assessment study. First quarterly technical progress report, October-December, 1982, 8:23858 (R:US)
DUSTS
Control
Research on air sprays and unique foam-application methods. Phase II-B report: laboratory investigation of air sprays, 8:22980 (R:US)
DYMAC SYSTEM
See NUCLEAR MATERIALS MANAGEMENT
PLUTONIUM
DYNAMIC MATERIALS ACCOUNTABILITY SYSTEM
See NUCLEAR MATERIALS MANAGEMENT
PLUTONIUM
DYNAMICS (BEAM)
See BEAM DYNAMICS
DYSPROSIUM 154
High Spin States
Shell structure at high spin and the influence on nuclear shapes, 8:24681 (R:US)

E

EARTH ATMOSPHERE
See also IONOSPHERE
MAGNETOSPHERE
MESOSPHERE
THERMOSPHERE
TROPOSPHERE
Boundary Layers
Spectral scales in the atmospheric boundary layer, 8:24253 (J:US)
Visibility
Visibility and the chemical composition of aerosols in air masses over Lake Michigan. Paper 81.21.5, 8:24254 (J:US)
Wave Propagation
Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants, 8:24726 (R:US)

EARTHQUAKES
Risk Assessment
An incentive approach to eliciting probabilities. Research report, 8:24307 (R:US)
Seismic Detection
Relationship of body and surface wave magnitudes for small earthquakes and explosions. Scientific report, 8:24223 (R:US)
Seismic discrimination. Semiannual technical sumMary report no. 36, 1 Oct 81-31 mar 82, 8:24222 (R:US)
EBIC
See SCANNING ELECTRON MICROSCOPY
ECCS
Design
Emergency core cooling system, 8:23521 (P:US)
ECONOMIC IMPACT
Forecasting
Short-term energy outlook. Volume 2. Methodology, 8:23690 (R:US)
ECONOMIC REGULATORY ADMINISTRATION
Government Policies
Allegations of improper supplier practices affecting gasoline lines at independent stations, 8:23042 (R:US)
ECR HEATING
Driver options for steady-state tokamak reactors, 8:25079 (J:US)
Plasma potential in a magnetic mirror with electron-cyclotron-resonance heating, 8:24761 (R:US)
Some novel features of the ordinary-mode electron-cyclotron resonance heating of tokamak plasmas, 8:24771 (R:US)
Computer Calculations
Ray-tracing study of electron-cyclotron heating in toroidal geometry, 8:24767 (R:US)
Control Systems
EBT-P plasma heating system instrumentation and control design, 8:25078 (J:US)
Efficiency
Quasi-optical ECRH beam system for MFTF-B, 8:24776 (R:US)
Microwave Amplifiers
Gyrotron - an ECH system component, 8:25121 (J:US)
Power Supplies
Beam waveguide launcher for high power ecrh heating in large tandem mirror machines, 8:25098 (J:US)
EDS LIQUEFACTION
See EXXON LIQUEFACTION PROCESS
EFFECTIVE ENERGY (INTERNAL IRRADIATION)
See INTERNAL IRRADIATION
EFFLUENTS (GASEOUS)
See GASEOUS WASTES
EFFLUENTS (RADIOACTIVE)
See RADIOACTIVE EFFLUENTS
EFFUSION
See DIFFUSION
EHV AC SYSTEMS
345-765 kV.
Electric Cables
Development of a fully synthetic tape insulation for lapped power cables, 8:23432 (R:US)
Electrical Faults
Use of oscillograph records for analyzing system performance, 8:23440 (R:US)
Monitoring
Use of oscillograph records for analyzing system performance, 8:23440 (R:US)
ELASTOMERS
See also RUBBERS
Mechanical Properties
Material properties for TR-55 and silicone elastomeric cushions, 8:24033 (R:US)
ELDERLY PEOPLE
Fuel Consumption
Residential fuel comparison patterns for poor, black, and elderly households: a comparative study. Vol I. Data base development, 8:23793 (R:US)
ELECTRIC APPLIANCES
Energy Efficiency
Investigation of the economic possibilities regarding the reduction of energy intensity for electrical household appliances. Vol. 1, 8:23797 (R:DE:In German)
ELECTRIC ARCS
Velocity
Arc velocity and erosion for stainless steel and aluminium cathodes, 8:24886 (J:NL)
ELECTRIC BATTERIES
Devices for production and/or storage of electrical energy from chemical reactions; excludes FUEL CELLS and RADIOISOTOPE BATTERIES.
See also LEAD-ACID BATTERIES
THERMAL BATTERIES
Anodes
Effect of electrolyte water content on the anodic passivation of lithium in 1m lic104-propylene carbonate, 8:23669 (R:US)
Bibliographies
Foreign technology alert bibliography: batteries and components. Final report Jun 80-May 82, 8:23680 (R:US)
Feasibility Studies
Studies leading to the development of high-rate lithium-sulfuryl chloride battery technology. Quarterly report No. 3, 1 Apr-30 Jun 82, 8:23668 (R:US)
Materials
Advanced electrochemical energy storage devices. Final report 1 Jan 78-31 Mar 80, 8:23681 (R:US)
Research Programs
Batteries for load leveling, 8:23408 (R:US)
Batteries for electric vehicles, 8:23885 (R:US)
Technology Assessment
Advanced electrochemical energy storage devices. Final report 1 Jan 78-31 Mar 80, 8:23681 (R:US)
Temperature Gradients
Three-dimensional thermal modeling of eV batteries, 8:23884 (R:US)
Uses
Wind-energy battery-storage project. Phase I. Final report, 8:23396 (R:US)
ELECTRIC CABLES
See also OIL-FILLED CABLES
SUPERCONDUCTING CABLES
Electrical Insulation
Development of a fully synthetic tape insulation for lapped power cables, 8:23432 (R:US)
Installation
Cable information retrieval program, 8:25106 (J:US)
Increasing pipe-cable section lengths. Final report, 8:23436 (R:US)
Positioning
Cable-positioning fixtures. Final report, 8:24101 (R:US)
Potting
Cable-positioning fixtures. Final report, 8:24101 (R:US)
Stresses
Increasing pipe-cable section lengths. Final report, 8:23436 (R:US)
ELECTRIC CONTACTORS
See SWITCHES
ELECTRIC FIELDS
Biological Effects
Effect of the electrical field in the membrane of photosynthesis. Final report, 8:24479 (R:US)
ELECTRIC GENERATORS
Rotating generators only; excludes DIRECT ENERGY CONVERTERS.
Contained Explosions
Electric generator, 8:23753 (P:US)
Design
Electric generator, 8:23753 (P:US)
ELECTRIC GROUNDS
TFTR grounding system, 8:25077 (J:US)
ELECTRIC MOTORS
Data Acquisition Systems
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R:US)

Dynamic Loads
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R:US)
Installation
Installation and operation of the motor-generator for the TEXT, 8:25028 (J:US)
Operation
Installation and operation of the motor-generator for the TEXT, 8:25028 (J:US)

ELECTRIC POWER
See also HYDROELECTRIC POWER
Monthly energy review, 8:23002 (R:US)
Consumption Rates
Development and characterization of electric power conservation and supply resource planning options, 8:23717 (R:US)
Cost
Projected costs of electricity from nuclear and coal-fired power plants. Volume 2, 8:23741 (R:US)
Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report, 8:23416 (R:US)
Flywheel Energy Storage
Advanced flywheel-storage system, 8:23662 (R:US)
Prices
Case for electricity: an applications approach, 8:23728 (R:US)
Electric power monthly (For July 1982), 8:23736 (R:US)
Electric power monthly (For November 1981), 8:23731 (R:US)
Electric power monthly (For April 1982), 8:23733 (R:US)
Electric power monthly (For June 1982), 8:23735 (R:US)
Electric power monthly (For May 1982), 8:23734 (R:US)
Electric power monthly (For February 1982), 8:23732 (R:US)
Electric power monthly (For October 1982), 8:23737 (R:US)
Electric Power Monthly, 8:23739 (R:US)
Typical electric bills. January 1, 1982, 8:23730 (R:US)
Utility Spot-Pricing Study: Wisconsin, 8:23748 (R:US)
Sales
Electric power monthly, 8:23738 (R:US)
Supply and Demand
Case for electricity: an applications approach, 8:23728 (R:US)
Trade
US-Canadian electricity trade, 8:23740 (R:US)

ELECTRIC POWER INDUSTRY
Use only for general papers that go beyond specific interests of the utility such as generation, transmission, rates, etc. and include one or more of the following: equipment manufacturers; educational or research activities; o
Boiler Fuels
Opportunities for pyrolysis technology in producing gas and combustible residues for use in electric power generation, 8:22909 (RA:CA)
Economic Analysis
ICOP; financial model industrial cogeneration (CDC CYBER170,175; FORTRAN IV), 8:23406 (R:US)
Occupational Safety
Definitive studies on pole-top resuscitation. Final report, 8:24481 (R:US)

ELECTRIC POWER RESEARCH INSTITUTE
See EPRI

ELECTRIC POWER SYSTEMS
See POWER SYSTEMS

ELECTRIC SWITCHES
See SWITCHES

ELECTRIC UTILITIES
Capacity
PICES; utility static generation reliability (IBM303x,360,370; FORTRAN IV), 8:23401 (R:US)
Energy Accounting
Marginal energy cost of goods and services. Final report, 8:23037 (R:US)
Financial Data
Progress report - operating accounts in 1981, 8:23743 (R:FR:In French)
Fuel Consumption
Regional analysis of potential impacts of electric and hybrid vehicles on electric utilities, 8:23729 (R:US)
Load Management
Economics of cool storage for electric load leveling, 8:23426 (J:US)
Issues in implementing a load-management program for direct load control. Final report, 8:23744 (R:US)
Off-Peak Energy Storage
Assessment of cool storage in commercial building applications, 8:23664 (R:US)
Batteries for load leveling, 8:23408 (R:US)
Economics of cool storage for electric load leveling, 8:23426 (J:US)
Review of environmental studies and issues on compressed-air energy storage, 8:23659 (R:US)
Operating Cost
Cost and quality of fuels for electric utility plants, 8:23003 (R:US)
PRODCOST; utility generating cost simulation (IBM360,370,303x; FORTRAN IV (97%) and Assembler (3%)), 8:23403 (R:US)
Operation
Progress report - operating accounts in 1981, 8:23743 (R:FR:In French)
Optimization
STOPS; power system short-term optimization (IBM303x,360,370; FORTRAN IV), 8:23402 (R:US)
Power Generation
Regional analysis of potential impacts of electric and hybrid vehicles on electric utilities, 8:23729 (R:US)
Rate Structure
Utility Spot-Pricing Study: Wisconsin, 8:23748 (R:US)
Reliability
PICES; utility static generation reliability (IBM303x,360,370; FORTRAN IV), 8:23401 (R:US)
Research Programs
R and D benefits assessment - a regional approach, 8:23746 (R:US)
Sales
Electric power monthly (For July 1982), 8:23736 (R:US)
Electric power monthly (For November 1981), 8:23731 (R:US)
Electric power monthly (For April 1982), 8:23733 (R:US)
Electric power monthly (For June 1982), 8:23735 (R:US)
Electric power monthly (For May 1982), 8:23734 (R:US)
Electric power monthly (For February 1982), 8:23732 (R:US)
Electric power monthly (For October 1982), 8:23737 (R:US)
Electric Power Monthly, 8:23739 (R:US)

ELECTRICAL ENGINEERING
Technology Assessment
Statistical report '82, 8:23749 (R:DE:In German)

ELECTRICAL EQUIPMENT
See also ANTENNAS
CIRCUIT BREAKERS
ELECTRICAL INSULATORS
LIGHTNING ARRESTERS
SWITCHES
Performance
Summary of the Plant Electrical Systems (PES) Study, 8:23550 (R:US)

ELECTRICAL INSULATION
Performance
Development of a fully synthetic tape insulation for lapped power cables, 8:23432 (R:US)

ELECTRICAL INSULATORS
Epoxides
Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage, 8:23439 (R:DE:In German)
Materials Testing
Results of an insulator materials test program for application inside the TFTR plasma chamber, 8:25158 (J:US)
Performance
Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage, 8:23439 (R:DE:In German)
Sulfur Fluorides
Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage, 8:23439 (R:DE:In German)

ELECTRIC-POWERED VEHICLES
See also HYBRID ELECTRIC-POWERED VEHICLES
Electric Batteries
Batteries for electric vehicles, 8:23885 (R:US)
Three-dimensional thermal modeling of eV batteries, 8:23884 (R:US)
Feasibility Studies
Electric vehicles: assessment of potential for North Central Region farm operations, 8:23887 (J:US)
Iron-Nickel Batteries
Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program, 8:23676 (R:US)
Lead-Acid Batteries
Development of unique lightweight high-performance lead-acid batteries, 8:23673 (R:US)
Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program, 8:23676 (R:US)
Legal Aspects
6th annual report to Congress for fiscal year 1982. Electric and Hybrid Vehicles Program, 8:23886 (R:US)
Market
Mission analysis of second cars to determine electric-vehicle suitability, 8:23883 (R:US)
Nickel-Zinc Batteries
Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program, 8:23676 (R:US)
Power Demand
Regional analysis of potential impacts of electric and hybrid vehicles on electric utilities, 8:23729 (R:US)
Research Programs
6th annual report to Congress for fiscal year 1982. Electric and Hybrid Vehicles Program, 8:23886 (R:US)
Specifications
Mission analysis of second cars to determine electric-vehicle suitability, 8:23883 (R:US)
Technology Assessment
Electric vehicles: assessment of potential for North Central Region farm operations, 8:23887 (J:US)
ELECTROCHEMICAL CELLS
See also ELECTRIC BATTERIES
PHOTOELECTROCHEMICAL CELLS
Anodes
Method for uniformly distributing carbon flakes in a positive electrode, the electrode made thereby and compositions, 8:23683 (P:US)
ELECTRODES
See also ANODES
CATHODES
Electric Potential
Applications of the DC-relaxation technique in Li-Al/FeS cell development, 8:23677 (R:US)
Materials
Electrodes and diaphragms for fuel cells, 8:23784 (R:DE:In German)
Quantitative Chemical Analysis
Lead deficiency and hydrogen content in battery electrode beta-PbO_2, 8:23684 (J:US)
ELECTROLYSIS
Electrolytic Cells
Electrolyzer module which uses bipolar electrodes with very high catalytic activity. Final report, 8:23204 (R:XE:FR)
ELECTROLYTIC CELLS
Design
Electrolyzer module which uses bipolar electrodes with very high catalytic activity. Final report, 8:23204 (R:XE:FR)
Electrodes
Electrodes and diaphragms for fuel cells, 8:23784 (R:DE:In German)
Feasibility Studies
High temperature water vapor electrolysis (HOT ELLY), 8:23203 (R:DE:In German)
Membranes
Development and parametric testing of alkaline water electrolysis cells for hydrogen production based on inorganic-membrane-electroylet technology. Final report, 8:23206 (R:US)
Production
Electrolyzer module which uses bipolar electrodes with very high catalytic activity. Final report, 8:23204 (R:XE:FR)
ELECTROMAGNETIC INTERACTIONS
Flavor Model
Analysis of preon models with a small number of flavors, 8:24628 (J:US)
ELECTROMAGNETIC LENSES
Beam Optics
TRANSPORT; design of charged particle beams (IBM370; FORTRAN IV), 8:24165 (R:US)
Computer Codes
TRANSPORT; design of charged particle beams (IBM370; FORTRAN IV), 8:24165 (R:US)
ELECTROMAGNETIC RADIATION
See also GAMMA RADIATION
LASER RADIATION
RADIOWAVE RADIATION
ULTRAVIOLET RADIATION
Backscattering
Kinetic analysis of electromagnetic wave backscattering in a magnetized plasma, 8:24808 (J:GB)
Biological Effects
Effects of electromagnetic radiation on calcium in the brain. Technical report, 8:24477 (R:US)
Biological Radiation Effects
Biological effects of radio-frequency radiation, 8:23820 (RA:US)
ELECTROMAGNETIC WAVES
See ELECTROMAGNETIC RADIATION
ELECTRON ACCEPTOR
See ELECTRONS
ELECTRON ATTACHMENT
A(neutral) + e yields A(1 minus).
Reviews
Electron-attachment processes, 8:24524 (R:US)
ELECTRON BEAM INDUCED CURRENT
See SCANNING ELECTRON MICROSCOPY
ELECTRON BEAM TARGETS
Electron beam transport through the atmosphere in reduced-density, current-carrying channels, 8:25153 (J:US)
ELECTRON BEAM WELDING
Technology Assessment
Possibilities of welding as a joining process in airframe construction, 8:24130 (TJ:US)
ELECTRON BEAMS
Beam Dynamics
Intense electron-beam autogenerator, 8:24169 (R:US)
Beam Monitors
Cherenkov light as a current-density diagnostic for large-area, repetitively pulsed electron beams, 8:24186 (R:US)
Scattering
Efficiency of free-electron lasers with a scattered electron beam, 8:24134 (J:US)
Velocity
Efficiency of free-electron lasers with a scattered electron beam, 8:24134 (J:US)
ELECTRON CHANNELING
Coherent Radiation
Coherent absorption and emission processes of energetic particles penetrating crystals, 8:24731 (BA:US)
Photon Emission
Coherent absorption and emission processes of energetic particles penetrating crystals, 8:24731 (BA:US)
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
X Radiation
Electron-channeling radiation: x-ray source feasibility study, 8:24729 (R:US)
ELECTRON COLLISIONS
See also ELECTRON-ION COLLISIONS
ELECTRON-MOLECULE COLLISIONS
ELECTRON-POSITRON COLLISIONS

Photon Emission
Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets, 8:24546 (R:US)

ELECTRON CYCLOTRON MASERS
See MICROWAVE AMPLIFIERS

ELECTRON CYCLOTRON-RESONANCE HEATING
See ECR HEATING

ELECTRON DONOR
See ELECTRONS

ELECTRON MULTIPLIERS
Secondary Emission
CONDYN; Polya model secondary electron spectra (CDC6600,7600; FORTRAN IV), 8:24510 (R:US)

ELECTRON SOURCES
Polarized Beams
Polarized electron source for parity experiment at Bates, 8:24176 (R:US)

ELECTRON SPECTROMETERS
Specifications
Photoelectron spectrometer for high-resolution angular resolved studies, 8:24209 (R:US)

ELECTRON TUBES
See also ELECTRON MULTIPLIERS
Electron flow generation of energy in a field of two transverse electromagnetic type waves. Preprint 218, 8:24750 (R:UA)

ELECTRONIC DATA PROCESSING
See DATA PROCESSING

ELECTRONIC EQUIPMENT
See also MICROWAVE EQUIPMENT
OSCILLOGRAPHS
POWER SUPPLIES
PULSE ANALYZERS
Control Systems
CLAP; linear control system design analysis (Commodore PET with IEEE 488 Bus interface and peripherals; BASIC), 8:24100 (R:US)
Interference
Electrical system waveform distortion, 8:23822 (RA:US)

ELECTRON-ION COLLISIONS
Ionization
Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence, 8:24554 (J:US)

ELECTRON-MOLECULE COLLISIONS
Photon Emission
Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets, 8:24546 (R:US)

ELECTRON-NUCLEON INTERACTIONS
See also ELECTRON-PROTON INTERACTIONS
Deep Inelastic Scattering
Ratio σ/sub L//σ/sub T/ from deep-inelastic electron scattering, 8:24602 (J:US)

ELECTRON-POSITRON COLLISIONS
Annihilation
Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets, 8:24546 (R:US)
Positron-annihilation characteristics in real solids including many-body enhancement effects, 8:24721 (R:US)

ELECTRON-POSITRON INTERACTIONS
Annihilation
Scaling violations in inclusive e^+e^- annihilation spectra, 8:24625 (J:US)
Inclusive Interactions
Scaling violations in inclusive e^+e^- annihilation spectra, 8:24625 (J:US)
Reviews
Results from PETRA, 8:24575 (R:DE)
Scaling Laws
Scaling violations in inclusive e^+e^- annihilation spectra, 8:24625 (J:US)

ELECTRON-PROTON INTERACTIONS
Scattering
Internal spin structure of the proton from high energy polarized e-p scattering, 8:24593 (RA:US)

ELECTRONS
Energy Losses
Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R:US)
Radiation Doses
Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R:US)

ELECTROSTATIC PRECIPITATORS
Research Programs
Advanced environmental control technology , 8:22952 (R:US)

ELECTROSTATIC WAVES
See PLASMA WAVES

ELMO BUMPY TORUS
Commercialization
Conceptual plant design for a commerical EBT reactor, 8:24930 (J:US)
Optimization studies of a commercial EBTR power plant, 8:24929 (J:US)
Design
Conceptual plant design for a commerical EBT reactor, 8:24930 (J:US)
Divertors
Mechanical design of a toroidal divertor for EBT-S, 8:24984 (J:US)
ECR Heating
EBT-P plasma heating system instrumentation and control design, 8:25078 (J:US)
Eddy Currents
Eddy current calculations for the tokamak fusion reactor through fields harmonics content, 8:24998 (J:US)
First Wall
Elmo Bumpy Torus-reactor first wall/blanket shield (FWBS) design, 8:24972 (J:US)
ICR Heating
EBT-P plasma heating system instrumentation and control design, 8:25078 (J:US)
Impurities
Analysis and design of a pumped-limiter impurity-control system for EBTR, 8:25171 (J:US)
Limiters
Analysis and design of a pumped-limiter impurity-control system for EBTR, 8:25171 (J:US)
Magnetic Field Configurations
Analysis of field error criteria in an EBT reactor, 8:25031 (J:US)
Microwave Amplifiers
60-GHz-gyrotron development program. Quarterly report No. 13, July-September 1982, 8:24836 (R:US)
Optimization
Optimization studies of a commercial EBTR power plant, 8:24929 (J:US)
Plasma Confinement
Electron confinement studies on the EBT-S Bumpy Torus Experiment using soft x-ray techniques, 8:24790 (J:US)
Studies of fusion product confinement and heating in EBT reactors, 8:24813 (J:US)
Plasma Heating
Electron confinement studies on the EBT-S Bumpy Torus Experiment using soft x-ray techniques, 8:24790 (J:US)
Studies of fusion product confinement and heating in EBT reactors, 8:24813 (J:US)
Superconducting Magnets
Comparison between experimental and analytical winding prestrain for a circular solenoid, 8:25017 (J:US)
EBTR magnet design, 8:25012 (J:US)
Tests of the first development coils for EBT-P, 8:25051 (J:US)
Vacuum Systems
Selection of vacuum seals for EBT-P, 8:25219 (J:US)
Thermal performance of EBT-P vacuum concepts, 8:24923 (J:US)

EMBEZZLEMENT
Weatherization program in West Virginia, 8:23812 (R:US)

EMERGENCIES
See ACCIDENTS

EMERGENCY CORE COOLING SYSTEM
See ECCS

EMERGENCY SHUTDOWN
See SCRAM

EMISSION COMPUTED TOMOGRAPHY
See also POSITRON COMPUTED TOMOGRAPHY

Equipment
Detectors, sampling, shielding, and electronics for positron emission tomography, 8:24342 (R:US)
EMPLOYEES
See PERSONNEL
EMS
Genetic Effects
Kinetics of mutation and sister-chromatid exchange induction by ethyl methanesulfonate in Chinese hamster ovary cells, 8:24476 (J:NL)
END USE SECTOR
See COMMERCIAL SECTOR
INDUSTRY
RESIDENTIAL SECTOR
TRANSPORTATION SECTOR
ENDOXAN
Toxicity
Systemic toxicology, 8:24442 (RA:US)
ENERGY
See also GEOTHERMAL ENERGY
SOLAR ENERGY
Bibliographies
Energy: a continuing bibliography with indexes (issue 29), 8:25286 (R:US)
Management
Energy management annual report. Fiscal year 1982, 8:23710 (R:US)
ENERGY ANALYSIS
Calculation Methods
Analytical developments in interzone and system coupling methodology, 8:23837 (J:US)
Energy Models
Role of allocation functions in energy modeling, 8:23695 (J:NL)
ENERGY AUDITS
Recommendations
Community energy audit: a discussion of process, resources, and potential problems, 8:23754 (R:US)
ENERGY CONSERVATION
Development and characterization of electric power conservation and supply resource planning options, 8:23717 (R:US)
Energy conservation, 8:23709 (R:DE:In German)
Constraints
Local-government energy-conservation programs and their impact on rental buildings, 8:23704 (R:US)
Economic Impact
Cost containment in hospitals through energy conservation (case histories of energy conservation based on a national survey of selected hospitals), 8:23708 (R:US)
Financial Incentives
Local-government energy-conservation programs and their impact on rental buildings, 8:23704 (R:US)
Financing
Innovative financing for energy-efficiency improvements. Phase II report: model documents and financial projections, 8:23705 (R:US)
Government Policies
Energy management annual report. Fiscal year 1982, 8:23710 (R:US)
Implementation
Energy management annual report. Fiscal year 1982, 8:23710 (R:US)
Mathematical Models
BECOM-BNL; buildings energy optimization model (CDC7600; PDS), 8:23795 (R:US)
Planning
Energy future Santa Cruz. A citizens' plan for energy self-reliance: executive summary, 8:23791 (R:US)
Program Management
Assessment of state plans for Title III of the National Energy Conservation Policy Act (NECPA), 8:23706 (R:US)
Energy conservation and the federal government: research, development, and management, 8:23707 (R:US)
Recommendations
Energy conservation and the federal government: research, development, and management, 8:23707 (R:US)
ENERGY CONSUMPTION
Monthly energy review, 8:23032 (R:US)
Monthly energy review, 8:23002 (R:US)
Forecasting
EIA symposium on short-term energy forecasting. Summary of the proceedings, 8:23721 (R:US)
Short-term energy outlook. Volume 2. Methodology, 8:23690 (R:US)
Recommendations
Energy use guidelines for public/nonprofit buildings, 8:23829 (J:US)
Statistics
Monthly Energy Review, 8:23755 (R:US)
ENERGY DEMAND
Monthly energy review, 8:23032 (R:US)
Econometrics
Documentation of International Energy Evaluation System. Volume 1. Overview, 8:23687 (R:US)
Forecasting
Documentation of International Energy Evaluation System. Volume 2, 8:23688 (R:US)
Energy projections for the National Energy Policy Plan, 8:23716 (J:US)
Short-term energy outlook. Volume 2. Methodology, 8:23690 (R:US)
Short-Term Energy Outlook. Volume 2. Methodology, 8:23713 (R:US)
ENERGY EFFICIENCY
Energy efficiency: the impact of conservation, 8:23792 (R:US)
ENERGY EXPENSES
Forecasting
Energy projections for the National Energy Policy Plan, 8:23716 (J:US)
ENERGY INFORMATION ADMINISTRATION
Data Base Management
ADP requirements study report. Volume 1. ADP requirements statement, 8:25269 (R:US)
ADP Requirements Study Report. Volume II. Appendices A, B, C and D, 8:25288 (R:US)
Data Processing
ADP requirements study report. Volume 1. ADP requirements statement, 8:25269 (R:US)
ADP requirements study report. Volume IV. Analysis of alternative options: projected ADP requirements, 8:25270 (R:US)
ADP requirements study report. Volume III. Appendix E, 8:25287 (R:US)
ADP requirements study report. Volume V. Procurement specifications statement, 8:25271 (R:US)
ENERGY MANAGEMENT
Evaluation
Content of local-energy-management programs, 8:23703 (R:US)
ENERGY MODELS
Analysis of financial assumptions in selected Energy Information Administration models, 8:23711 (R:US)
Development and application of the NPPC commercial-energy-demand model, 8:23694 (R:US)
Documentation of International Energy Evaluation System. Volume 2, 8:23688 (R:US)
Documentation of International Energy-Evaluation System, 8:23689 (R:US)
Marginal energy cost of goods and services. Final report, 8:23037 (R:US)
Modeling international steam-coal trade, 8:23007 (R:US)
Pacific Northwest regional energy planning module III: policy options and programs. Development of standards and program packages. Volume I. Summary. Final report, Phase 2, 8:23693 (R:US)
Short-term energy outlook. Volume 2. Methodology, 8:23690 (R:US)
Allocations
Role of allocation functions in energy modeling, 8:23695 (J:NL)
Forecasting
Role of allocation functions in energy modeling, 8:23695 (J:NL)

I Codes
Documentation of International Energy Evaluation System. Volume 1. Overview, 8:23687 (R:US)
Manuals
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications, 8:23013 (R:US)
ENERGY POLICY
Carbon dioxide and climate. A bibliography, 8:24233 (R:US)
Future world oil prices: review of current forecasts, identification of price-determining factors, and delineation of a quantitative framework for analysis, 8:23035 (R:US)
State-local relations and urban technology: a study in intergovernmental decision making - executive summary, 8:24304 (R:US)
Economic Impact
Argonne Energy Model - Portugal, 8:23692 (R:US)
Environmental Impacts
Role of the breeder in long-term energy economics, 8:23701 (R:US)
Planning
Pacific Northwest regional energy planning module III: policy options and programs. Development of standards and program packages. Volume I. Summary. Final report, Phase 2, 8:23693 (R:US)
Standards
Pacific Northwest regional energy planning Module III: policy options and programs. Development of standards and program packages. Volume II. Technical report. Final report, Phase 2, 8:23719 (R:US)
ENERGY SOURCE DEVELOPMENT
Meetings
Selected papers from the energy workshop: industry perspectives on pioneer process plants, 8:23750 (R:US)
ENERGY STORAGE
See also COMPRESSED AIR ENERGY STORAGE
FLYWHEEL ENERGY STORAGE
HEAT STORAGE
MAGNETIC ENERGY STORAGE
OFF-PEAK ENERGY STORAGE
PHOTOCHEMICAL ENERGY STORAGE
Switches
Repetitive switching for inductive energy storage. Final technical report Apr 81-Jun 82, 8:23661 (R:US)
ENERGY SUPPLIES
See also FUEL SUPPLIES
Monthly energy review, 8:23032 (R:US)
Energy Conservation
Development and characterization of electric power conservation and supply resource planning options, 8:23717 (R:US)
Energy Models
Documentation of International Energy-Evaluation System, 8:23689 (R:US)
Forecasting
Analysis of financial assumptions in selected Energy Information Administration models, 8:23711 (R:US)
EIA symposium on short-term energy forecasting. Summary of the proceedings, 8:23721 (R:US)
Energy projections for the National Energy Policy Plan, 8:23716 (J:US)
ENEWETAK
See ENIWETOK
ENGINEERED SAFETY SYSTEMS
See also CONTAINMENT SYSTEMS
ECCS
Systems Analysis
Preliminary investigation of interconnected systems interactions for the safety injection system of Indian Point-3, 8:23638 (R:US)
ENGINEERING GEOLOGY
Quality Assurance
Application of QA to geoscience investigations, 8:24482 (J:US)
ENHANCED RECOVERY
See also MICROBIAL EOR
Meetings
Enhanced oil recovery, 8:23025 (B:FR)
ENIWETOK
Radioecology
Comparative behavior of plutonium and americium in the equatorial Pacific, 8:24295 (R:US)
ENRICHMENT (ISOTOPIC)
See ISOTOPE SEPARATION
ENRICO FERMI-1 REACTOR
Reactor Decommissioning
Evaluation of nuclear-facility decommissioning projects, Enrico Fermi-1 reactor, 8:23530 (R:US)
ENVIRONMENT
Pollutants
Attempting a forecast on the future occurence of pollutants in food on the basis of today's and future production figures and patterns of application of chemicals, 8:24262 (R:DE:In German)
ENVIRONMENTAL EXPOSURE CHAMBERS
See EXPOSURE CHAMBERS
ENVIRONMENTAL POLICY
Carbon dioxide and climate. A bibliography, 8:24233 (R:US)
ENVIRONMENTAL TEMPERATURE
See AMBIENT TEMPERATURE
ENVIRONMENTAL TRANSPORT
See also RADIONUCLIDE MIGRATION
Computerized Simulation
Long-term simulation of sediment and contaminant transport, 8:24291 (R:US)
Mathematical Models
Intercomparison of MAP3S models of long-range transport and deposition, 8:24231 (R:US)
Statistical Models
Statistical performance of several mesoscale atmospheric dispersion models, 8:24250 (J:US)
ENZYMES
The enzyme code numbers from ENZYME NOMENCLATURE: RECOMMENDATIONS (1972) OF THE INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY AND THE INTERNATIONAL UNION OF BIOCHEMISTRY is given in a Scope Note for the individual enzymes.
See also TRANSFERASES
Genetic Mapping
Genetic basis of mutagenesis and carcinogenesis, 8:24418 (RA:US)
EOR
See ENHANCED RECOVERY
EPITHELIUM
Neoplasms
Normal and neoplastic growth in epithelial cells, 8:24444 (RA:US)
EPOXIDES
Dielectric Properties
Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage, 8:23439 (R:DE:In German)
Impurities
Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage, 8:23439 (R:DE:In German)
Physical Radiation Effects
Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (III), 8:24020 (TJ:US)
EPOXY COMPOUNDS
See EPOXIDES
EPRI
Research Programs
R and D benefits assessment - a regional approach, 8:23746 (R:US)
EPSTEIN-BARR VIRUS
See ONCOGENIC VIRUSES
EQUATIONS
See also DIFFERENTIAL EQUATIONS
EQUATIONS OF STATE

Numerical Solution
LINPACK; simultaneous linear algebraic equations (IBM360,370 (designed to be machine-independent); FORTRAN), 8:25242 (R:US)

EQUATIONS (DIFFERENTIAL)
See DIFFERENTIAL EQUATIONS

EQUATIONS OF STATE
Information Centers
SESAME '83: report on the Los Alamos Equation-of-State Library, 8:23969 (R:US)
Information Systems
SESAME '83: report on the Los Alamos Equation-of-State Library, 8:23969 (R:US)

EQUIPMENT
Use of a more specific term is recommended.
See also CAPACITIVE ENERGY STORAGE EQUIPMENT
DRILLING EQUIPMENT
ELECTRICAL EQUIPMENT
ELECTRONIC EQUIPMENT
FARM EQUIPMENT
HEAT RECOVERY EQUIPMENT
HYDRAULIC EQUIPMENT
MATERIALS HANDLING EQUIPMENT
MINING EQUIPMENT
PARTICLE SIZE CLASSIFIERS
POLLUTION CONTROL EQUIPMENT
SOLAR EQUIPMENT
THERMAL ENERGY STORAGE EQUIPMENT
WELL LOGGING EQUIPMENT
X-RAY EQUIPMENT
Design
Detectors, sampling, shielding, and electronics for positron emission tomography, 8:24342 (R:US)
Maintenance
PROMSYS; programmed equipment maintenance (IBM370; ANS COBOL (97%) and Assembly language (3%)), 8:24094 (R:US)

ERBIUM 164
Giant Resonance
Observation of giant dipole resonances built on states of high energy, 8:24678 (RA:DE:In German)

ERBIUM 166 TARGET
Krypton 86 Reactions
Dynamical coupling of relative motion, deformations and charge transfer within a Fokker-Planck equation for deep inleastic collisions, 8:24682 (RA:DE:In German, English)

ERBIUM 168 TARGET
Neon 20 Reactions
Spin polarization in $^{20}Ne + {}^{168}Er$ collisions at 13.5 MeV/N, 8:24654 (RA:DE:In German)

ERBIUM 170 TARGET
Neon 22 Reactions
Spectroscopy of neutron-rich nuclei via particle-γ-coincidences with a magnetic spectrograph, 8:24202 (RA:DE:In German)

ERBIUM BORIDES
Ferromagnetism
Study of coexistence of ferromagnetism and superconductivity in single-crystal $ErRh_4B_4$, 8:23996 (R:US)
Magnetic Specific Heat
Magnetic correlations in $ErRh_4B_4$, 8:24015 (BA:US)
Phase Transformations
Observation of a first-order phase transition in single-crystal $ErRh_4B_4$ at H/sub c2/, 8:24002 (R:US)
Spin-Lattice Relaxation
^{11}B study of spin dynamics in Y/sub 1-x/RE/sub x/Rh_4B_4 (RE = Gd, Er), 8:23999 (R:US)
Superconductivity
Observation of a first-order phase transition in single-crystal $ErRh_4B_4$ at H/sub c2/, 8:24002 (R:US)
Study of coexistence of ferromagnetism and superconductivity in single-crystal $ErRh_4B_4$, 8:23996 (R:US)

ERGONOMICS
See HUMAN FACTORS ENGINEERING

ERYTHROCYTES
Biological Indicators
Area program in population genetics. Final report, November 1, 1975-August 31, 1982, 8:24366 (R:US)
Cell Membranes
Studies of membrane structure by freeze-etching. Final report, January 1, 1979-December 31, 1982, 8:24325 (R:US)
Temperature Effects
Theoretical and applied cryobiology, 8:24397 (RA:US)

ESCHERICHIA COLI
Biological Radiation Effects
Lethality in repair-proficient Escherichia coli after 365nm ultraviolet light irradiation is dependent on fluence rate, 8:24393 (J:GB)
Respiration shutoff in Escherichia coli and Salmonella typhimurium after far-uv irradiation, 8:24375 (RA:US)
Genetic Radiation Effects
Genetics of repair of radiation damage to DNA in bacteria, 8:24381 (RA:US)

1,2-ETHANEDIOL
See GLYCOLS

ETHANOL FUELS
Use for pure ethanol, ethanol-water mixtures, or ethanol with additives; for ethanol-gasoline mixtures, use GASOHOL.
Feasibility Studies
Annotated review of the technological state-of-the-art of ethyl and methyl alcohol-based fuels and determination of the economic feasibility of commercial-scale production of such fuels, 8:23238 (R:US)
Production
Annotated review of the technological state-of-the-art of ethyl and methyl alcohol-based fuels and determination of the economic feasibility of commercial-scale production of such fuels, 8:23238 (R:US)

ETHERS
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)

ETHINE
See ACETYLENE

ETHOCEL
See CELLULOSE
ETHERS

ETHYL METHANESULFONATE
See EMS

ETHYLENE GLYCOL
See GLYCOLS

ETHYLENE POLYMERS
See POLYETHYLENES

ETHYNE
See ACETYLENE

EUCLIDEAN QUANTUM FIELD THEORY
See CONSTRUCTIVE FIELD THEORY

EUPHORBIA
Productivity
New sources for fuel and materials, 8:23282 (J:US)

EUROPE
District Heating
Assessment of European district-heating technology, 8:23702 (R:US)

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARC
See CERN

EUROPIUM SULFIDES
Superconductivity
Hydrostatic pressure effects on the superconductivity of La/sub 1.2-x/Eu/sub x/MO_6S_8 pseudoternary compounds, 8:24041 (J:US)
Transition Temperature
Hydrostatic pressure effects on the superconductivity of La/sub 1.2-x/Eu/sub x/MO_6S_8 pseudoternary compounds, 8:24041 (J:US)

EVACUATED TUBE COLLECTORS
Compound Parabolic Concentrators
Direct solar steam-generating system, 8:23316 (R:US)

EVAPORATORS
Scale Control
Investigation of water chemical effects resulting from the application of additivs in MSF-plants, 8:23847 (R:DE:In German)

EXCHANGE (HEAT)
See HEAT TRANSFER

EXHAUST GASES
Chemical Composition
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
Mutagen Screening
Mutagenicity of diesel exhaust particle extracts: influence of driving cycle and environmental temperature, 8:24456 (J:US)
EXPERIMENTAL FACILITIES (ACCELERATOR)
See ACCELERATOR FACILITIES
EXPLOSIVE FRACTURING
Comparative Evaluations
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R:US)
EXPLOSIVELY-DRIVEN MHD GENERATORS
See PULSED MHD GENERATORS
EXPOSURE CHAMBERS
Design
Semidynamic inhalation exposure system, 8:24437 (RA:US)
EXTRACTION (SOLVENT)
See SOLVENT EXTRACTION
EXTRAHIGH VOLTAGE ALTERNATING CURRENT SYS
See EHV AC SYSTEMS
EXXON DONOR SOLVENT LIQUEFACTION
See EXXON LIQUEFACTION PROCESS
EXXON LIQUEFACTION PROCESS
Engineering
EDS-coal-liquefaction process development. Phase IV. Construction of Exxon Coal-Liquefaction Pilot Plant. Final report, 8:22919 (R:US)
Pilot Plants
EDS-coal-liquefaction process development. Phase IV. Construction of Exxon Coal-Liquefaction Pilot Plant. Final report, 8:22919 (R:US)
Overview of coal liquefaction in the US Department of Energy, 8:22917 (R:US)
Pumps
EDS-coal-liquefaction process development. Phase IV. Construction of Exxon Coal-Liquefaction Pilot Plant. Final report, 8:22919 (R:US)

F

FABRIC FILTERS
Performance
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
FACILITIES (ACCELERATOR)
See ACCELERATOR FACILITIES
FACILITIES (MILITARY)
See MILITARY FACILITIES
FACILITIES (NUCLEAR)
See NUCLEAR FACILITIES
FACILITIES (RESOURCE RECOVERY)
See RESOURCE RECOVERY FACILITIES
FACILITIES (STORAGE)
See STORAGE FACILITIES
FACILITIES (TEST)
See TEST FACILITIES
FAILED ELEMENT DETECTION
DN detection during SLSF tests, 8:23587 (R:US)
FALLOUT
For radioactive fallout only.
See also FALLOUT DEPOSITS
Radionuclide Migration
Comparative behavior of plutonium and americium in the equatorial Pacific, 8:24295 (R:US)
FALLOUT DEPOSITS
Mathematical Models
Estimation of airborne and surface contamination resulting from the deposition-resuspension process, 8:24251 (J:GB)
FALLOUT PARTICULATES
See FALLOUT PARTICLES
FARADAY GENERATORS
See MHD GENERATORS
FARM EQUIPMENT
Feasibility Studies
Electric vehicles: assessment of potential for North Central Region farm operations, 8:23887 (J:US)
Technology Assessment
Electric vehicles: assessment of potential for North Central Region farm operations, 8:23887 (J:US)
FAST BREEDER TYPE REACTORS
See FBR TYPE REACTORS
FAST FLUX TEST FACILITY REACTOR
See FFTF REACTOR
FAST REACTORS
See also FBR TYPE REACTORS
FFTF REACTOR
ZPR-9 REACTOR
Fuel Assemblies
Fluid-cushioned impact between reactor fuel assemblies for seismic disturbances, 8:23643 (J:US)
Reactor Accidents
PROSA2; probabilistic response surface studies (IBM370; FORTRAN IV (95%) and Assembly language (5%)), 8:23580 (R:US)
Reactor Licensing
BONAMI-S: response self-shielding by the Bondarenko method. Volume 2. Functional studies (BONAMI-S code), 8:23543 (R:US)
FAST-MIXED SPECTRUM REACTOR
See FBR TYPE REACTORS
FATTY ACIDS
See CARBOXYLIC ACIDS
FAULT TREE ANALYSIS
Computer Codes
IMPORTANCE; FTA basic event & cut set ranking (IBM370; FORTRAN IV), 8:25240 (R:US)
FAULT TREE SYSTEMS
See FAULT TREE ANALYSIS
FBR TYPE REACTORS
See also LMFBR TYPE REACTORS
Energy Policy
Role of the breeder in long-term energy economics, 8:23701 (R:US)
Reactor Core Disruption
ALICE-11: an arbitary lagrangian-eulerian code for containment analysis with complex internals, 8:23642 (J:US)
F-CHART
Computer Codes
FCHART/SLR2.0; solar heating system performance (DEC20;DEC VAX11/780; FORTRAN 77), 8:23311 (R:US)
FEDAL
See FAILED ELEMENT DETECTION
FEDERAL ENERGY ADMINISTRATION
See US FEA
FEDERAL ENERGY REGULATORY COMMISSION
See US FERC
FEDERAL REGION V
Prior to June 1982 this concept was indexed to GREAT LAKES REGION.
See also ILLINOIS
INDIANA
MICHIGAN
OHIO
Energy Demand
Midwest region energy outlook, 8:23686 (R:US)
Energy Sources
Midwest region energy outlook, 8:23686 (R:US)
Energy Supplies
Midwest region energy outlook, 8:23686 (R:US)
FEDERAL REPUBLIC OF GERMANY
The growth of energy consumption and prices in the USA, FRG, France, and the UK, 1950-1980. Final report, 8:23757 (R:US)
Coal Gasification Plants
Further development on a 170 MW prototype plant with pressurized coal gasification and gas-/steam turbine power plant at Luenen, 8:22912 (R:DE:In German)

Coal Mines
Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries, 8:22977 (R:PL)
Coal Mining
Coal mining in the West German power industry in 1981, 8:22979 (R:DE:In German)
Coal Reserves
Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries, 8:22977 (R:PL)
Cogeneration
Chances of continued heat and power generation in public power stations in combination with district heating, 8:23747 (R:DE:In German)
Combined-Cycle Power Plants
Further development on a 170 MW prototype plant with pressurized coal gasification and gas-/steam turbine power plant at Luenen, 8:22912 (R:DE:In German)
District Heating
Chances of continued heat and power generation in public power stations in combination with district heating, 8:23747 (R:DE:In German)
Electrical Engineering
Statistical report '82, 8:23749 (R:DE:In German)
Energy Conservation
Energy conservation, 8:23709 (R:DE:In German)
Energy Policy
Activity report 1981/82, 8:23718 (R:DE:In German)
Environmental Policy
Air pollution by sulfur dioxide, 8:24240 (R:DE:In German)
Nuclear Power Plants
Operating experiences with nuclear power plants in the Federal Republic of Germany (1974 summary), 8:23444 (TJ:US)

FEDERAL WATER POLLUTION CONTROL ACT
See CLEAN WATER ACT

FEED MATERIALS PLANTS
Radioactivity Transport
UDAD; uranium dispersion & dosimetry model (IBM370,303x; FORTRAN IV (94%), PLL/I (4%), and Assembly language (2%). The only use of PL/I is the auxiliary plotting program, CONTOUR. The only use of Assembly language is the DATE, Gregorian calendar date routine), 8:23187 (R:US)

FERMI FLUID
See FERMI GAS

FERMI GAS
Ground States
Hard-core square-well fermions, 8:24756 (J:US)
Pade Approximation
Hard-core square-well fermions, 8:24756 (J:US)
Pairing Interactions
Hard-core square-well fermions, 8:24756 (J:US)

FERMI LEVEL
Measuring Methods
Installation of a positron annihilation apparatus for the investigation of Fermi surfaces, 8:24725 (R:DE:In German)
Positron Beams
Installation of a positron annihilation apparatus for the investigation of Fermi surfaces, 8:24725 (R:DE:In German)

FERMI LIQUID
See FERMI GAS

FERMI SURFACE
See FERMI LEVEL

FERMI-DIRAC GAS
See FERMI GAS

FERRIMAGNETIC MATERIALS
See also FERRITES
Fabrication
Magnetic powder for treatment of oil-polluted waste water and process for manufacturing the powder (Japanese patent), 8:23975 (TG:US)
Surface Coating
Magnetic powder for treatment of oil-polluted waste water and process for manufacturing the powder (Japanese patent), 8:23975 (TG:US)

FERRITES
Specific compounds should be indexed by coordination of a descriptor of the form (CATION) COMPOUNDS and the above anion descriptor.
Recycling
Process for removal of organic solvents (Japanese Patent), 8:24054 (TG:US)
Sorptive Properties
Process for removal of organic solvents (Japanese Patent), 8:24054 (TG:US)

FERROMAGNETIC MATERIALS
Spin Waves
Spin waves at surfaces and steps in ferromagnets and antiferromagnets, 8:24741 (R:US)

FERTILE MATERIALS
Neutron Reactions
DOPSEL; self-shielding in the resonance region (IBM370; FORTRAN IV), 8:24702 (R:US)

FESSENHEIM-1 REACTOR
Fuel Rods
High burnup irradiation programs of the FRAGEMA 17 x 17 standard fuel, 8:23479 (RA:US)

FESSENHEIM-2 REACTOR
Fuel Rods
High burnup irradiation programs of the FRAGEMA 17 x 17 standard fuel, 8:23479 (RA:US)

FETUSES
Prenatal Irradiation
Effects of monomeric ^{239}Pu on the fetal rabbit, 8:24394 (J:GB)

FFTF REACTOR
Reactor Vessels
Steady-state simulation of the FFTF in-vessel thermal hydraulics, 8:23577 (J:US)

FIBER OPTICS
Data Transmission
Method for transmitting analog data over a fiber-optic link, 8:25194 (J:US)
Wide band fiber optic analog data link, 8:25195 (J:US)

FIBERGLASS
Evaluation
Diallyl phthalate prepolymer characterization and testing in fiberglass filled molding compounds, 8:24019 (R:US)

FIELD OFFICES
See US DOE FIELD OFFICES

FIELD-REVERSED MIRROR REACTORS
FRTP prototype power reactors with neutral-beam heating and pellet injection, 8:25080 (J:US)
Breeding Blankets
Low activation blanket for the moving ring field-reversed mirror reactor, 8:24978 (J:US)

FIELDS (ELECTRIC)
See ELECTRIC FIELDS

FIELDS (MAGNETIC)
See MAGNETIC FIELDS

FILLING STATIONS
See GASOLINE SERVICE STATIONS

FILTERS
See also FABRIC FILTERS
Efficiency
Development of dry-filter dust extractors to reduce dust development during operation of heading machines, 8:24229 (R:DE:In German)
Particle size for greatest penetration of HEPA filters - and their true efficiency, 8:24244 (R:US)
Radiation Heating
CHART; iodine decay heat on charcoal adsorbers (IBM360,370,303x; FORTRAN IV), 8:23583 (R:US)
Sealing Materials
Removable, hermetically-sealing, filter attachment system for hostile environments, 8:23552 (P:US)
Thermal Analysis
CHART; iodine decay heat on charcoal adsorbers (IBM360,370,303x; FORTRAN IV), 8:23583 (R:US)

FINANCIAL DATA
Financial management in the oil-shale program, 8:23080 (R:US)

FINANCIAL MANAGMENT
See PROGRAM MANAGEMENT
FINANCING
Comparative Evaluations
Energy company development patterns in the postembargo era. An overview of financial performance, 1974-1980. Volume 1: analysis of trends (Glossary), 8:23699 (R:US)
FINGERPRINTING (OIL SPILLS)
See OIL SPILLS
FINITE ELEMENT METHOD
Mesh Generation
INGEN; finite element program mesh generator (CDC7600; FORTRAN IV), 8:25261 (R:US)
FINS
Roughness
Friction factor correlation for the offset strip-fin matrix, 8:24104 (R:US)
FIRE STATIONS
See PUBLIC BUILDINGS
FIREDAMP
See METHANE
FIREWOOD
See WOOD FUELS
FIRST WALL
Cleaning
Study of the erosion rate of vacuum arcs in a transverse magnetic field, 8:24885 (J:NL)
Coatings
Development of low-Z surface coatings for JT-60 first wall, 8:24908 (J:NL)
Structure of metallic coatings for impurity control in MACROTOR, 8:24882 (J:NL)
Creep
Creep deformation of first wall components following a plasma disruption, 8:24890 (J:NL)
Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall, 8:24827 (R:US)
Degassing
Outgassing characteristics of TiC coated materials, 8:24909 (J:NL)
Design
Conceptual design and material consideration on toroidal CTR first wall, 8:24963 (J:US)
Conceptual design of the INTOR first wall system, 8:25173 (J:US)
Conceptual design of the INTOR first-wall system, 8:24823 (R:US)
Elmo Bumpy Torus-reactor first wall/blanket shield (FWBS) design, 8:24972 (J:US)
Key design issues in the definition of the fusion engineering device (FED) first wall and limiter features, 8:24961 (J:US)
Towards strategy of reliable fusion first wall design, 8:24960 (J:US)
Electromagnetic Radiation
FELIX: an experimental facility to study electromagnetic effects for first wall, blanket, and shield systems, 8:24970 (J:US)
Embrittlement
Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall, 8:24827 (R:US)
Erosion
Can wall and limiter erosion be eliminated in fusion reactors?, 8:24966 (J:US)
Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall, 8:24827 (R:US)
Global estimates of impurity levels and wall erosion in INTOR, 8:24869 (J:NL)
INTOR first wall erosion during plasma disruption, 8:24964 (J:US)
Self-sustaining erosion-resistant low z coatings for first wall and limiter applications I: theory, 8:24967 (J:US)
Fatigue
Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall, 8:24827 (R:US)
Fatigue data of molybdenum, 8:25164 (J:US)
Heat Flux
Dynamics of melting, evaporation, and resolidification of materials exposed to plasma disruptions, 8:24893 (J:NL)
Heat Transfer
Gas dynamics and heat transfer phenomena in liquid metal ICF reactor first surfaces, 8:25138 (J:US)
Jets
Liquid jet experiments: relevance to inertial confinement fusion reactors, 8:25156 (J:US)
Materials Testing
Important material considerations in INTOR, 8:24820 (R:US)
Modular Structures
Modular first wall concept for steady state operation, 8:24965 (J:US)
Permeability
Tritium permeation in fusion reactor first walls, 8:24901 (J:NL)
Radioactivation
Environment and safety: major goals for MARS, 8:24846 (R:US)
Sputtering
Numerical analysis of plasma-wall interaction for an oblique magnetic field, 8:24794 (J:NL)
Stresses
Low density cavity gas fireball dynamics in the light ion beam target development facility, 8:24920 (J:US)
Swelling
Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall, 8:24827 (R:US)
Test Facilities
FELIX: an experimental facility to study electromagnetic effects for first wall, blanket, and shield systems, 8:24970 (J:US)
The FELIX experimental program and future upgrades, 8:24971 (J:US)
Thermonuclear Reactor Materials
Surface segregation in binary alloy first wall candidate materials, 8:24904 (J:NL)
Wall Loading
Dynamics of melting, evaporation, and resolidification of materials exposed to plasma disruptions, 8:24893 (J:NL)
Melt layer stability following a plasma disruption, 8:24894 (J:NL)
Modeling the thermodynamic response of metallic first walls during a plasma disruption, 8:24891 (J:NL)
Review of the plasma-material interaction problems for reacting and burning plasma experiments, 8:24796 (J:NL)
FISCHER-TROPSCH SYNTHESIS
Bench-Scale Experiments
Synthesis of liquids and pipeline gas by Fischer-Tropsch, 8:23221 (R:US)
Catalysts
Catalysts and relations of selectivity for the Fischer-Tropsch-Synthesis, 8:22915 (R:DE:In German)
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Synthesis of liquids and pipeline gas by Fischer-Tropsch, 8:23221 (R:US)
Transportation fuels from indirect coal liquefaction (US DOE; reviews and considers work in other countries), 8:22918 (R:US)
Chemical Reaction Yield
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Optimization
Synthesis of liquids and pipeline gas by Fischer-Tropsch, 8:23221 (R:US)
FISH CULTURE
See FISHERIES
FISH HATCHERIES
See FISHERIES

FISHERIES
Prior to August 1981, this concept was indexed to AQUACULTURE.
Biomass
Habitat suitability index models: regression models based on harvest of cool and coldwater fishes in reservoirs, 8:24398 (R:US)
FISHES
Habitat
Habitat suitability index models: regression models based on harvest of cool and coldwater fishes in reservoirs, 8:24398 (R:US)
FISSILE MATERIALS
Neutron Reactions
DOPSEL; self-shielding in the resonance region (IBM370; FORTRAN IV), 8:24702 (R:US)
FISSION
Neon 20 Reactions
Fission fragment angular correlation in 300 MeV ^{20}Ne induced reactions on heavy targets, 8:24686 (RA:DE:In German, English)
FISSION PRODUCT RELEASE
Coordinate with descriptors for the area of release such as BIOSPHERE or COOLANTS, and for the specific fission products, if known.
Computer Calculations
Comparison of COMETHE-IIIJ and FCODE-BETA fission gas-release predictions with measurements. Final report (PWR; BWR), 8:23466 (R:US)
FISSIONABLE MATERIALS MANAGEMENT
See NUCLEAR MATERIALS MANAGEMENT
FIXED-PRICE CONTRACTS
Cost Overruns
Tokamak Fusion Test Reactor Project, 8:24828 (R:US)
FLAMES
Optical Properties
Comparative study of the combustion of alternate liquid fuels, 8:22994 (R:US)
FLASH HYDROPYROLYSIS PROCESS
Comparative Evaluations
The flash pyrolysis and hydropyrolysis of coal, 8:22901 (RA:CA)
Research Programs
The Canmet research program on coal pyrolysis - application to eastern Canada, 8:22905 (RA:CA)
FLASKS
See CASES
FLAT PLATE COLLECTORS
Bibliographies
Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975, 8:23323 (R:US)
Performance Testing
Determination of incident angle modifiers for flat-plate solar collectors. Final report, 8:23353 (R:US)
Test Facilities
Test stations for flat plate collectors for Iran, Brazil and India, 8:23259 (R:DE:In German)
FLOW CYTOMETERS
See CELL FLOW SYSTEMS
FLOW (FLUID)
See FLUID FLOW
FLUE GAS
Air Pollution Control
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
Electrostatically augmented gas-cleanup devices for particular removal, 8:22947 (R:US)
Chemical Analysis
Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R:US)
Chemical Composition
Slow strain rate stress corrosion testing of boiler construction materials in synthetic flue gas at elevated temperatures, 8:23910 (RA:US)
Corrosive Effects
Slow strain rate stress corrosion testing of boiler construction materials in synthetic flue gas at elevated temperatures, 8:23910 (RA:US)
Denitrification
DOE's electron-beam-irradiation development program (Avco/EBARA (E-beam/ammonia) Process; Research-Cottrell (E-beam/lime slurry) process), 8:22954 (R:US)
Simultaneous removal of SO_2 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R:US)
Desulfurization
Advanced environmental control technology , 8:22952 (R:US)
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
DOE's electron-beam-irradiation development program (Avco/EBARA (E-beam/ammonia) Process; Research-Cottrell (E-beam/lime slurry) process), 8:22954 (R:US)
Effect of trace metals and sulfite oxidation of adipic acid degradation in FGD systems. Final report Dec 81-May 82, 8:22957 (R:US)
Experimental evaluation of spray-dryer flue-gas desulfurization for use with Eastern US coals, 8:23428 (R:US)
Flue gas desulfurization information system data base user's manual, 8:24241 (R:US)
Process for removing sulfur oxides from gases with direct production of a usable finished reaction product, 8:22943 (R:DE:In German)
Simultaneous removal of SO_2 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R:US)
Hot Gas Cleanup
Advanced environmental control technology , 8:22952 (R:US)
Sampling
Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R:US)
Scrubbing
Process for removing sulfur oxides from gases with direct production of a usable finished reaction product, 8:22943 (R:DE:In German)
FLUID FLOW
See also INCOMPRESSIBLE FLOW
LIQUID FLOW
POTENTIAL FLOW
STEADY FLOW
TURBULENT FLOW
TWO-PHASE FLOW
Computer Calculations
Fortran computer-code package for the evaluation of gas-phase viscosities, conductivities, and diffusion coefficients (CHEMKIN), 8:24137 (R:US)
Computer Codes
COMPARE/MOD1A; transient flow with sinks & doors (CDC7600,CYBER175; FORTRAN IV), 8:23468 (R:US)
VARR2; CRBRP 2-dimensional transient fluid flow analysis (CDC7600; FORTRAN IV and COMPASS), 8:23509 (R:US)
Mathematics
Self-similar solutions for converging shocks and collapsing cavities, 8:24573 (J:US)
FLUID MECHANICS
See also HYDRODYNAMICS
Computer Codes
DISPL1; 1- and 2-dimensional kinetics-diffusion partial differential equations solution (IBM370/195,303x;CDC7600,6600,CYBER175; MORTRAN2 (80%) and FORTRAN (20%)), 8:24569 (R:US)
FLUIDIZATION
Chemical Reaction Kinetics
Yield of the oxidation of very rarefied propane/air mixtures in catalytic fluidized beds, 8:24571 (R:DE:In German)
FLUIDIZED BED HEAT EXCHANGERS
Comparative Evaluations
Economic evaluation of competing industrial waste-heat-recovery technologies, 8:23856 (R:US)

FLUIDIZED-BED COMBUSTION
Efficiency
Review of low-rank-coal AFBC testing, 8:22996 (R:US)
Heat Transfer
Review of low-rank-coal AFBC testing, 8:22996 (R:US)
FLUIDIZED-BED COMBUSTORS
Adsorbents
Standardized test methods for investigating attrition and elutriation characteristics of natural sorbents in fluidized-bed coal combustors, 8:24149 (R:US)
Demonstration Plants
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Materials
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Operation
Standardized test methods for investigating attrition and elutriation characteristics of natural sorbents in fluidized-bed coal combustors, 8:24149 (R:US)
Performance
Exploratory and basic fluidized-bed combustion studies. Annual report, October 1980-September 1981, 8:24148 (R:US)
High pressure combustor at Leatherhead Test seven results: dolomite size effects, 8:24151 (R:US)
Research Programs
High pressure combustor at Leatherhead Test seven results: dolomite size effects, 8:24151 (R:US)
Systems Analysis
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Technology Assessment
Advanced pressurized fluidized-bed combustion, 8:24150 (R:US)
FLUIDS
Not for BODY FLUIDS.
See also DRILLING FLUIDS
GASES
GEOTHERMAL FLUIDS
LIQUIDS
RESERVOIR FLUIDS
Mixtures
Enskog theory for multicomponent mixtures. I. Linear transport theory, 8:24751 (J:US)
Sound Waves
Acoustic scattering by elastic solid cylinders and spheres in viscous fluids, 8:24753 (J:US)
Transport Theory
Enskog theory for multicomponent mixtures. I. Linear transport theory, 8:24751 (J:US)
FLUID-STRUCTURE INTERACTIONS
Mathematical Models
Fluid-cushioned impact between reactor fuel assemblies for seismic disturbances, 8:23643 (J:US)
FLUORESCENCE SPECTROSCOPY
Design
Unique developments in laser-induced fluorescence fluorimetry (LIFF), 8:24294 (RA:US)
Performance
Unique developments in laser-induced fluorescence fluorimetry (LIFF), 8:24294 (RA:US)
FLUORESCENT LAMPS
Interference
Conducted and radiated signatures of fluorescent lamp systems in C and I environments, 8:23823 (RA:US)
FLUORIMETRY
See FLUORESCENCE SPECTROSCOPY
FLUORINATED ALIPHATIC HYDROCARBONS
Breakdown
Anomalous electron-attachment properties of perfluoropropylene (1-C_3F_6) and their effect on the breakdown strength of this gas, 8:24523 (R:US)
Electron Attachment
Anomalous electron-attachment properties of perfluoropropylene (1-C_3F_6) and their effect on the breakdown strength of this gas, 8:24523 (R:US)
FLUORINE
Atom-Molecule Collisions
Applications of classical trajectory techniques to reactive scattering, 8:24566 (J:US)
Ion-Molecule Collisions
Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982, 8:24522 (R:US)
FLUORINE 19
Hyperfine Structure
Hyperfine fields at ^{19}F in nickel in the critical region, 8:23958 (RA:DE:In German)
FLUORINE FLUORIDES
See FLUORINE
FLY ASH
Chemical Analysis
Inorganic compound identificatioon of fly ash emissions from municipal incinerators. Final report, 8:24051 (R:US)
FLYWHEEL ENERGY STORAGE
Design, fabrication and erection of flywheel-generator-convertors for the JET tokamak, 8:25060 (J:US)
Efficiency
Advanced flywheel-storage system, 8:23662 (R:US)
FLYWHEELS
Design
Advanced flywheel-storage system, 8:23662 (R:US)
FMIT FACILITY
See FMIT LINAC
FMIT LINAC
Linear Accelerator at the Hanford Fusion Materials Irradiation Test Facility.
Shielding
Radiation shielding issues on the FMIT, 8:24979 (J:US)
Targets
Preliminary assessment of interactions between the FMIT deuteron beam and liquid-lithium target, 8:24831 (R:US)
FOLIAGE
See LEAVES
FOOD
See also ANIMAL FEEDS
Pollutants
Attempting a forecast on the future occurence of pollutants in food on the basis of today's and future production figures and patterns of application of chemicals, 8:24262 (R:DE:In German)
Procurement
Excessive costs incurred by the Strategic Petroleum Reserve program for rental and other services, 8:23722 (R:US)
FOODSTUFFS
See FOOD
FOREST LITTER
Natural organic debris on the forest floor.
Biodegradation
Effects of simulated acid precipitation on carbon and nitrogen mineralization in soil, 8:24256 (RA:US)
Resource Assessment
Potential of organic residues for the production of basic chemical compounds. Pt. 1, 8:23849 (R:DE:In German)
Waste Product Utilization
Potential of organic residues for the production of basic chemical compounds. Pt. 1, 8:23849 (R:DE:In German)
Potential of organic residues for the production of basic chemical compounds, 8:23852 (R:DE:In German)
FORESTRY
Information Systems
Activity-Reporting System User's Manual. Version 1.2, 8:24355 (R:US)
User's manual for the Caretaker Information System. Version 1.2, 8:24354 (R:US)
FORESTS
Biological Models
POLUTE; forest air pollutant uptake model (IBM360,370; CSMP), 8:24301 (R:US)
Short Rotation Cultivation
Analysis of short-rotation forests using the Argonne model for selecting economic strategy (MOSES), 8:23256 (R:US)

FORMALDEHYDE
Biological Effects
Induction and progression of neoplasia in tracheal epithelium, 8:24443 (RA:US)
FORMALIN
See FORMALDEHYDE
FORMALITH
See FORMALDEHYDE
FORMIC ALDEHYDE
See FORMALDEHYDE
FORMING (MATERIALS)
See MATERIALS WORKING
FORMOL
See FORMALDEHYDE
FORT CALHOUN-1 REACTOR
See CALHOUN-1 REACTOR
FORTRAN
Libraries
SOFTWARE TOOLS; program development interface (Base version (This version is not tailored to any one machine but serves as a portable base for the user who can add "primitives" or modify the base source to tailor SOFTWARE TOOLS to the local computing environment.); FORTRAN IV and RATFOR), 8:25258 (R:US)
FOSSIL FUEL RESERVES
See FOSSIL FUELS
FOSSIL FUELS
See also COAL
NATURAL GAS
OIL SHALES
PETROLEUM
SHALE OIL
Economic Analysis
ASPEN; advanced system for process engineering (IBM303x;DEC VAX11/780; FORTRAN IV (99%) and Assembly language (1%) for the IBM CMS version. All of ASPEN except easily replaceable system utilities is written in ANS FORTRAN X3.9-1966. THE DEC VAX version is completely FORTRAN IV.), 8:22899 (R:US)
FOSSIL-FUEL POWER PLANTS
Ashes
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Economic Analysis
Investment analysis in electricity supply. Staff working paper, 8:23422 (R:US)
Projected costs of electricity from nuclear and coal-fired power plants. Volume 2, 8:23741 (R:US)
Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report, 8:23416 (R:US)
Environmental Effects
Polychlorinated dibenzo-p-dioxins: criteria for their effects on man and his environment, 8:22961 (R:CA)
Variability of mercury concentrations of midcontinent soils, USA; baseline data for a coal-fired power plant, 8:24259 (J:US)
Flue Gas
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R:US)
Fuel Consumption
Cost and quality of fuels for electric utility plants (For January 1982), 8:23410 (R:US)
Cost and quality of fuels for electric utility plants (For April 1982), 8:23411 (R:US)
Cost and quality of fuels for electric utility plants (For September 1982), 8:23412 (R:US)
Cost and quality of fuels for electric utility plants, 8:23413 (R:US)
Cost and quality of fuels for electric utility plants (November 1982), 8:23414 (R:US)
Electric power monthly (For July 1982), 8:23736 (R:US)
Electric power monthly (For November 1981), 8:23731 (R:US)
Electric power monthly (For April 1982), 8:23733 (R:US)
Electric power monthly (For June 1982), 8:23735 (R:US)
Electric power monthly (For May 1982), 8:23734 (R:US)
Electric power monthly (For February 1982), 8:23732 (R:US)
Electric power monthly, 8:23738 (R:US)
Electric power monthly (For October 1982), 8:23737 (R:US)
Electric Power Monthly, 8:23739 (R:US)
Fuel Substitution
Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report, 8:23416 (R:US)
Materials
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Operating Cost
Projected costs of electricity from nuclear and coal-fired power plants. Volume 2, 8:23741 (R:US)
Plumes
SULCAL; model of sulfur chemistry in a plume (IBM360,370; FORTRAN IV), 8:24228 (R:US)
Power Generation
Electric power monthly (For July 1982), 8:23736 (R:US)
Electric power monthly (For November 1981), 8:23731 (R:US)
Electric power monthly (For April 1982), 8:23733 (R:US)
Electric power monthly (For June 1982), 8:23735 (R:US)
Electric power monthly (For May 1982), 8:23734 (R:US)
Electric power monthly (For February 1982), 8:23732 (R:US)
Electric power monthly, 8:23738 (R:US)
Electric power monthly (For October 1982), 8:23737 (R:US)
Electric Power Monthly, 8:23739 (R:US)
Retrofitting
Performance advantages of a gas-stream MHD retrofit, 8:23772 (R:US)
Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report, 8:23416 (R:US)
Site Selection
Investment analysis in electricity supply. Staff working paper, 8:23422 (R:US)
Technology Assessment
Energy technology data handbook. Vol. 1, 8:23423 (R:DE)
Waste Management
Solid waste management at fossil plants, 8:22948 (R:US)
FOUNDATIONS
Design
Transmission-line structure foundations for uplift-compression loading. Final report, 8:23437 (R:US)
Motion
Transmission-line structure foundations for uplift-compression loading. Final report, 8:23437 (R:US)
Safety
Transmission-line structure foundations for uplift-compression loading. Final report, 8:23437 (R:US)
Testing
Transmission-line structure foundations for uplift-compression loading. Final report, 8:23437 (R:US)
FRAGMENTS (FALLOUT)
See FALLOUT
FRAGMENTS (PARTICLES)
See PARTICLES
FRANCE
The growth of energy consumption and prices in the USA, FRG, France, and the UK, 1950-1980. Final report, 8:23757 (R:US)
Electric Utilities
Progress report - operating accounts in 1981, 8:23743 (R:FR:In French)
Heat Flow
Determination du flux geothermique en France (Determination of the geothermal heat flow in France), 8:23371 (R:US)
FREE ELECTRON LASERS
Efficiency
Efficiency of free-electron lasers with a scattered electron beam, 8:24134 (J:US)
FREE RADICALS
See RADICALS

FREONS
Thermodynamic Properties
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R:US)
FRM DEVICES (THERMONUCLEAR)
See FIELD-REVERSED MIRROR REACTORS
FTR REACTOR (RICHLAND)
See FFTF REACTOR
FUEL ASSEMBLIES
Burnup
Design and development of KWU 18 x 18 PWR and 9 x 9 BWR fuel assemblies and their relevance to burnup increase, 8:23459 (RA:US)
Design
Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982, 8:23473 (R:US)
Reactor Core Disruption
Fluid-cushioned impact between reactor fuel assemblies for seismic disturbances, 8:23643 (J:US)
Specifications
Design and development of KWU 18 x 18 PWR and 9 x 9 BWR fuel assemblies and their relevance to burnup increase, 8:23459 (RA:US)
Development of an extended burnup fuel assembly (PWR), 8:23488 (RA:US)
FUEL CANS
Corrosion
Observations and analyses of the corrosion behavior of PWR fuel, 8:23487 (RA:US)
Deformation
Study of LWR fuel behavior by well characterized tests. Part I. Inpile measurement of cladding diametral deformation with burnup, 8:23454 (RA:US)
Performance Testing
Study of LWR fuel behavior by well characterized tests. Part I. Inpile measurement of cladding diametral deformation with burnup, 8:23454 (RA:US)
Stress Corrosion
Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours, 8:23920 (RA:US)
FUEL CELL POWER PLANTS
For commercial, residential, or electric utility use.
Design
20 kW fuel cell units of compact assembly. Pt. 6, 7, 8:23789 (R:DE:In German)
Operation
20 kW fuel cell units of compact assembly. Pt. 6, 7, 8:23789 (R:DE:In German)
FUEL COOLING INSTALLATIONS
See SPENT FUEL STORAGE
FUEL CYCLE
Cost
Economics of extended burnup from a utility point of view (PWR; BWR), 8:23532 (RA:US)
Effect of reduced enrichment on the fuel cycle for research reactors, 8:23576 (R:US)
Extended burnup implementation: assessment and experience (PWR), 8:23491 (RA:US)
Extending BWR burnup with spectral shift control, 8:23535 (RA:US)
Projected national and world benefits to the LWR fuel cycle from extended burnup, 8:23533 (RA:US)
Economics
Impact of extended burnup on the BWR fuel cycle, 8:23534 (RA:US)
FUEL ELEMENT FAILURE
International over-ramp project at Studsvik, 8:23483 (RA:US)
Fission Product Release
Release of fission products from irradiated aluminide fuel at high temperature, 8:23604 (R:US)
FUEL ELEMENTS
See also ANNULAR FUEL ELEMENTS
FUEL PINS
FUEL PLATES
FUEL RODS
SPENT FUEL ELEMENTS
Accounting
Active neutron coincidence counting for the assay of MTR fuel elements, 8:23193 (R:US)
Mathematical Models
FUELS DATA; model verification fuel rod data (CDC CYBER176,175;CDC7600; FORTRAN IV for the auxiliary edit program, data are recorded as EBCDIC characters.), 8:23446 (R:US)
FUEL FABRICATION PLANTS
Design
Sphere-pac fuel development program. Semi-annual progress report, April 1982-September 1982, 8:23106 (R:US)
FUEL FEEDING SYSTEMS
Design
Design and performance of feed-delivery systems for simulated radioactive waste slurries, 8:23160 (R:US)
Performance
Design and performance of feed-delivery systems for simulated radioactive waste slurries, 8:23160 (R:US)
FUEL GAS
See also LOW BTU GAS
NATURAL GAS
Combustion
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
Desulfurization
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program, 8:23782 (R:US)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program, 8:23781 (R:US)
Fuel Substitution
Technical and economic evaluation of retrofitting and repowering oil-fired boilers with gas from coal. Final report, 8:23416 (R:US)
Hot Gas Cleanup
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program, 8:23782 (R:US)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program, 8:23781 (R:US)
Purification
Advanced environmental control technology , 8:22952 (R:US)
Handbook of gasifiers and gas-treatment systems (39 gasification processes and 40 gas processing systems), 8:22920 (R:US)
FUEL KERNELS
See FUEL PARTICLES
FUEL MANAGEMENT
Burnable poisons for extended burnup fuel management: present and future (PWR), 8:23492 (RA:US)
Economics of extended burnup from a utility point of view (PWR; BWR), 8:23532 (RA:US)
Fuel management schemes for PWR extended burnup fuel cycles with gadolinium, 8:23493 (RA:US)
FUEL OILS
See also HEATING OILS
Consumption Rates
Cost and quality of fuels for electric utility plants, 8:23413 (R:US)
Cost and quality of fuels for electric utility plants (November 1982), 8:23414 (R:US)
Fuel Consumption
Cost and quality of fuels for electric utility plants (For January 1982), 8:23410 (R:US)
Cost and quality of fuels for electric utility plants (For April 1982), 8:23411 (R:US)
Cost and quality of fuels for electric utility plants (For September 1982), 8:23412 (R:US)
Prices
Cost and quality of fuels for electric utility plants (For January 1982), 8:23410 (R:US)

Cost and quality of fuels for electric utility plants (For April 1982), 8:23411 (R:US)
Cost and quality of fuels for electric utility plants (For September 1982), 8:23412 (R:US)
Cost and quality of fuels for electric utility plants, 8:23413 (R:US)
Cost and quality of fuels for electric utility plants (November 1982), 8:23414 (R:US)
Rate guide for residential No. 2 heating oil and coal for SOLCOST Data Bank cities, 8:23001 (R:US)
Recovery
Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R:US)
FUEL PARTICLES
Chemical Preparation
Production of spherical UO/sub 2/-UC/sub 2/ for nuclear fuel applications using thermochemical principles, 8:23108 (J:US)
Fabrication
Sphere-pac fuel development program. Semi-annual progress report, April 1982-September 1982, 8:23106 (R:US)
Freezing
The effects of flowing fuel particulate on bulk freezing predictions, 8:23647 (J:US)
Melting
The effects of flowing fuel particulate on bulk freezing predictions, 8:23647 (J:US)
FUEL PELLETS
Burnup
Duplex fuel: British and Danish experience and evaluation (PWR), 8:23489 (RA:US)
Performance Testing
Duplex fuel: British and Danish experience and evaluation (PWR), 8:23489 (RA:US)
Specifications
Duplex fuel: British and Danish experience and evaluation (PWR), 8:23489 (RA:US)
FUEL PENCILS
See FUEL PINS
FUEL PINS
Deformation
COVE1; creep collapse for oval fuel pin tube (CDC6600; FORTRAN IV), 8:23555 (R:US)
Performance Testing
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R:US)
FUEL PLATES
Fission Product Release
Release of fission products from irradiated aluminide fuel at high temperature, 8:23604 (R:US)
FUEL RACKS
Evaluation
Rack test and facility enhancement program, 8:23115 (R:US)
Testing
Rack test and facility enhancement program, 8:23115 (R:US)
FUEL REPROCESSING
See REPROCESSING
FUEL REPROCESSING PLANTS
By-Products
Potential for large-scale uses for fission-product Xenon, 8:23105 (R:US)
Radiation Accidents
Search of the Russian scientific literature for the descriptions of the medical consequences of the Kyshtym accident, 8:23188 (R:US)
Radioactive Waste Management
Technology for recovery of byproducts, 8:23173 (R:US)
Radioactive Waste Processing
Potential for beneficial use of krypton-85, 8:23170 (R:US)
FUEL RODS
Burnable Poisons
Burnable poisons for extended burnup fuel management: present and future (PWR), 8:23492 (RA:US)
Fuel management schemes for PWR extended burnup fuel cycles with gadolinium, 8:23493 (RA:US)
Burnup
ASEA-ATOM BWR fuel rod experience at high burnup, 8:23452 (RA:US)
Burnable poisons for extended burnup fuel management: present and future (PWR), 8:23492 (RA:US)
BWR high burnup licensing assessment, 8:23461 (RA:US)
Densification, swelling, and microstructures of LWR fuels through extended burnups, 8:23485 (RA:US)
Design, fabrication, and performance of high burn-up sphere-pac fuel rods (LMFBR), 8:23517 (RA:US)
DOE/GE/NSP extended burnup program, 8:23451 (RA:US)
Duplex fuel: British and Danish experience and evaluation (PWR), 8:23489 (RA:US)
Economics of extended burnup from a utility point of view (PWR; BWR), 8:23532 (RA:US)
Evaluation of published high burnup fission gas release data (PWR; BWR), 8:23456 (RA:US)
Extended burnup fuel investigations in commercial reactors (BWR), 8:23449 (RA:US)
Extended burnup implementation: assessment and experience (PWR), 8:23491 (RA:US)
Extending BWR burnup with spectral shift control, 8:23535 (RA:US)
Fission gas release from PWR fuel rods under conditions of normal operation and power ramping, 8:23481 (RA:US)
Fission gas release at high burnup, 8:23482 (RA:US)
Fission gas release from fuel rods irradiated in US commercial light water reactors, 8:23457 (RA:US)
Fuel management schemes for PWR extended burnup fuel cycles with gadolinium, 8:23493 (RA:US)
Fuel performance characteristics at extended burnup (PWR), 8:23475 (RA:US)
Fuel performance experience of high burnup fuel in RWE reactors (PWR), 8:23480 (RA:US)
High burnup performance of BN fuels in LWR's, 8:23453 (RA:US)
Impact of extended burnup on the BWR fuel cycle, 8:23534 (RA:US)
International over-ramp project at Studsvik, 8:23483 (RA:US)
Irradiation tests on barrier fuel in support of a large-scale demonstration (BWR), 8:23460 (RA:US)
KWU experience and analysis of LWR fuel with respect to high burnup, 8:23450 (RA:US)
LOCA analysis of annular fuel pellet design for extended burnup (PWR), 8:23606 (RA:US)
LWR extended burnup: fuel performance and utilization, 8:23448 (R:US)
LWR extended burnup: fuel performance and utilization, 8:23458 (R:US)
Observations and analyses of the corrosion behavior of PWR fuel, 8:23487 (RA:US)
Projected national and world benefits to the LWR fuel cycle from extended burnup, 8:23533 (RA:US)
PWR high burnup licensing assessment, 8:23490 (RA:US)
Regulatory perspective on extended burnup fuel (PWR; BWR), 8:23522 (RA:US)
Risoe Fission Gas Project: an overview (PWR; BWR), 8:23462 (RA:US)
Study of LWR fuel behavior by well characterized tests. Part I. Inpile measurement of cladding diametral deformation with burnup, 8:23454 (RA:US)
Study of LWR fuel behavior by well characterized tests. Part II. Post-irradiation examination and its related analysis of TSURUGA fuel, 8:23455 (RA:US)
Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel, 8:23463 (RA:US)
Fabrication
Design, fabrication, and performance of high burn-up sphere-pac fuel rods (LMFBR), 8:23517 (RA:US)
Fission Product Release
Comparison of COMETHE-IIIJ and FCODE-BETA fission gas-release predictions with measurements. Final report (PWR; BWR), 8:23466 (R:US)
Evaluation of published high burnup fission gas release data (PWR; BWR), 8:23456 (RA:US)
Fission gas release from PWR fuel rods under conditions of normal operation and power ramping, 8:23481 (RA:US)
Fission gas release at high burnup, 8:23482 (RA:US)

Fission gas release from fuel rods irradiated in US commercial light water reactors, 8:23457 (RA:US)
Risoe Fission Gas Project: an overview (PWR; BWR), 8:23462 (RA:US)
Fuel Management
Extended burnup implementation: assessment and experience (PWR), 8:23491 (RA:US)
Projected national and world benefits to the LWR fuel cycle from extended burnup, 8:23533 (RA:US)
Fuel-Cladding Interactions
Irradiation tests on barrier fuel in support of a large-scale demonstration (BWR), 8:23460 (RA:US)
Inspection
DOE/GE/NSP extended burnup program, 8:23451 (RA:US)
Meetings
LWR extended burnup: fuel performance and utilization, 8:23448 (R:US)
LWR extended burnup: fuel performance and utilization, 8:23458 (R:US)
Performance Testing
ASEA-ATOM BWR fuel rod experience at high burnup, 8:23452 (RA:US)
Densification, swelling, and microstructures of LWR fuels through extended burnups, 8:23485 (RA:US)
Design, fabrication, and performance of high burn-up sphere-pac fuel rods (LMFBR), 8:23517 (RA:US)
Duplex fuel: British and Danish experience and evaluation (PWR), 8:23489 (RA:US)
EPRI/B and W cooperative program on PWR fuel-rod performance. Final report, 8:23498 (R:US)
Evaluation of published high burnup fission gas release data (PWR; BWR), 8:23456 (RA:US)
Extended burnup fuel investigations in commercial reactors (BWR), 8:23449 (RA:US)
Fission gas release from PWR fuel rods under conditions of normal operation and power ramping, 8:23481 (RA:US)
Fission gas release at high burnup, 8:23482 (RA:US)
French analytical experience on high burnup performance of PWR fuel elements under steady-state conditions, 8:23486 (RA:US)
Fuel performance characteristics at extended burnup (PWR), 8:23475 (RA:US)
Fuel performance experience of high burnup fuel in RWE reactors (PWR), 8:23480 (RA:US)
High burnup performance of BN fuels in LWR's, 8:23453 (RA:US)
High burnup effects on the pellet-cladding interaction phenomenon (PWR), 8:23484 (RA:US)
KWU experience and analysis of LWR fuel with respect to high burnup, 8:23450 (RA:US)
LOCA analysis of annular fuel pellet design for extended burnup (PWR), 8:23606 (RA:US)
LWR extended burnup: fuel performance and utilization, 8:23448 (R:US)
LWR extended burnup: fuel performance and utilization, 8:23458 (R:US)
Observations and analyses of the corrosion behavior of PWR fuel, 8:23487 (RA:US)
Study of LWR fuel behavior by well characterized tests. Part I. Inpile measurement of cladding diametral deformation with burnup, 8:23454 (RA:US)
Study of LWR fuel behavior by well characterized tests. Part II. Post-irradiation examination and its related analysis of TSURUGA fuel, 8:23455 (RA:US)
Simulators
Thermal and mechanical behaviour of PWR fuel rod simulators for LOCA-experiments, 8:23619 (R:DE)
Specifications
Duplex fuel: British and Danish experience and evaluation (PWR), 8:23489 (RA:US)
Stress Analysis
GAPCON-THERMAL3; fuel steady state & transient behavior (CDC6600,7600,CYBER74; CDC Extended FORTRAN IV), 8:23554 (R:US)
Thermal Analysis
GAPCON-THERMAL3; fuel steady state & transient behavior (CDC6600,7600,CYBER74; CDC Extended FORTRAN IV), 8:23554 (R:US)
Turbulent Flow
Tube crossflow force measurements, 8:23541 (R:US)
FUEL SHEATHS
See FUEL CANS
FUEL SLUGS
See FUEL RODS
FUEL SLURRIES
Chemical Composition
Comparative study of the combustion of alternate liquid fuels (Middle and high boiling SRC-II distillates coal-oil mixtures), 8:22994 (R:US)
Coking
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Combustion Products
Comments on the effect of coal-particle-size consist on furnace ash deposition, 8:22998 (R:US)
Combustion Properties
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R:US)
Comparative study of the combustion of alternate liquid fuels (Middle and high boiling SRC-II distillates coal-oil mixtures), 8:22994 (R:US)
Electrochemistry
Electrochemical studies of coal slurry oxidation mechanisms, 8:22937 (J:US)
Heat Transfer
Proposal for research on heat transfer and hydrodynamics in preheaters for direct coal-liquefaction processes (Up to 450°C and 2000 psig), 8:22928 (R:US)
Oxidation
Electrochemical studies of coal slurry oxidation mechanisms, 8:22937 (J:US)
Performance Testing
Coal-liquid mixture combustion tests in oil-designed boilers at CTEP, 8:22997 (R:US)
Physical Properties
Proposal for research on heat transfer and hydrodynamics in preheaters for direct coal-liquefaction processes (Up to 450°C and 2000 psig), 8:22928 (R:US)
Pumping
Investigation of pulsation in slurry-pumping systems in coal-liquefaction plants. Final report, 8:22929 (R:US)
Viscosity
Proposal for research on heat transfer and hydrodynamics in preheaters for direct coal-liquefaction processes (Up to 450°C and 2000 psig), 8:22928 (R:US)
FUEL SUBSTITUTION
Economic Analysis
Modeling industrial-boiler retirement economics, 8:23696 (R:US)
FUEL SUPPLIES
Mathematical Models
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
FUEL SUSPENSIONS
See FUEL SLURRIES
FUEL-CLADDING INTERACTIONS
High burnup effects on the pellet-cladding interaction phenomenon (PWR), 8:23484 (RA:US)
Fuel Motion Detection
The effects of flowing fuel particulate on bulk freezing predictions, 8:23647 (J:US)
Mathematical Models
Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J:US)
Plugging
Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J:US)
Thermal Conductivity
Fuel - cladding gap conductance measurements using Kalman filter methods, 8:23546 (J:US)

FUELS
See also BOILER FUELS
FOSSIL FUELS
FUEL SLURRIES
LIQUID FUELS
NUCLEAR FUELS
REFUSE DERIVED FUELS
SYNTHETIC FUELS
THERMONUCLEAR FUELS
WOOD FUELS
Operating Cost
Cost and quality of fuels for electric utility plants, 8:23003 (R:US)

FUELS (NUCLEAR)
See NUCLEAR FUELS

FUELWOOD
See WOOD FUELS

FULL-SERVE STATIONS
See GASOLINE SERVICE STATIONS

FUMES
See AEROSOLS

FUNCTIONS
See also RIEMANN FUNCTION
SPECTRAL FUNCTIONS
Finite Difference Method
OCOPTR;DRVOCR; unconstrained optimization (IBM360,370; FORTRAN IV), 8:25233 (R:US)

FUNGI
See also YEASTS
Cultivation Techniques
Organisms and compounds of unnatural isotopic composition in NMR, 8:24348 (R:US)

FURNACE OIL
See HEATING OILS

FURNACES
Burners
Multi-fuel low-NO/sub x/ burner development, Phase II. Final report Mar 79-Feb 82, 8:24152 (R:US)
Fuel Economy
Ceramic heat pipes for high-temperature heat recovery, 8:23866 (J:GB)
Thermal Insulation
High temperature automated creep testing of ceramic fiber board, 8:24017 (RA:US)

FUSED SALTS
See MOLTEN SALTS

FUSION FUELS
See THERMONUCLEAR FUELS

FUSION (MELTING)
See MELTING

FUSION (NUCLEAR)
See THERMONUCLEAR REACTIONS

FUSION REACTIONS
Beam Profiles
Fusion reactivities for several beam and target ion distributions, 8:24847 (J:US)
Targets
Fusion reactivities for several beam and target ion distributions, 8:24847 (J:US)

FUSION REACTORS
See THERMONUCLEAR REACTORS

FUSION (WELDING)
See WELDING

G

GADOLINIUM
Nuclear Quadrupole Resonance
Quadrupole moment of the 7⁻ isomer in ^{148}Sm, 8:24677 (RA:DE:In German)

GADOLINIUM 150
Giant Resonance
Observation of giant dipole resonances built on states of high energy, 8:24678 (RA:DE:In German)

GADOLINIUM 156
Gyromagnetic Ratio
Observation of a decrease in the g-factors of sup(156,160)Gd at high spins, 8:24688 (RA:DE:In German, English)

GADOLINIUM 160
Gyromagnetic Ratio
Observation of a decrease in the g-factors of sup(156,160)Gd at high spins, 8:24688 (RA:DE:In German, English)

GADOLINIUM BORIDES
Spin-Lattice Relaxation
^{11}B study of spin dynamics in Y/sub 1-x/RE/sub x/Rh_4B_4 (RE = Gd, Er), 8:23999 (R:US)

GADOLINIUM OXIDES
Sintering
Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982, 8:23473 (R:US)
Thermal Conductivity
Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982, 8:23473 (R:US)

GALLIUM ARSENIDES
Corrosion
Kinetic aspects of the n-GaAs/(S/Se)sub(n)sup(2-) photoelectrochemical cell, 8:23262 (R:FR)
Electrical Properties
Electrical characterization of grain boundaries in GaAs, 8:24034 (J:US)
Grain Boundaries
Electrical characterization of grain boundaries in GaAs, 8:24034 (J:US)
Phase Transformations
Phase transitions in high magnetic fields, 8:23888 (R:US)

GAMMA ASTRONOMY
For photon energies above 100 KeV.
Gamma-line astronomy, 8:24507 (J:GB)

GAMMA RADIATION
Transmission
SPAR1; shielding with analytic ray-tracing (CDC6600,7600; FORTRAN IV), 8:24719 (R:US)

GAMMA SOURCES
For cosmic sources of gamma radiation use COSMIC GAMMA SOURCES.
Dose Rates
PELSHIE2; point kernel integration shielding (IBM360,303x; FORTRAN IV (99%) and BAL (1%)), 8:24720 (R:US)

GARRETT PROCESS
See OXY MODIFIED IN-SITU PROCESS

GAS BLANKETS
For plasma confinement. For other gas blankets see COVER GAS or INERT ATMOSPHERE.
Energy Balance
Summary of processes relevant for the particle balance of a cold plasma blanket contaminated with a small amount of helium, 8:24837 (R:NL)

GAS BURSTS
See ROCK BURSTS

GAS CENTRIFUGES
Gas Flow
Green's function for Onsager's pancake equation, 8:23103 (R:US)

GAS COOLANTS
See GASES

GAS COOLED REACTORS
See also HTGR TYPE REACTORS
Bibliographies
Gas-cooled reactor technology: a bibliography, 8:23507 (R:US)

GAS ENGINES
See INTERNAL COMBUSTION ENGINES

GAS FIELDS
See NATURAL GAS FIELDS

GAS HEAT PUMPS
Power Supplies
Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23802 (R:DE:In German)
GAS INJECTION
Computerized Control Systems
Design and development of the torus gas injection control system for TFTR, 8:25103 (J:US)
GAS LASERS
Stabilization
Inductively stabilized rare-gas halide minilaser for long-pulsed operation, 8:24133 (J:US)
GAS SPILLS
Energy and technology review, 8:24842 (R:US)
Aerial Monitoring
BAGI: a technique for the detection and tracking of large gas clouds, 8:23070 (R:US)
Computer Codes
SLAB: a time-dependent computer model for the dispersion of heavy gases released in the atmosphere, 8:23068 (R:US)
Environmental Transport
Denser-than-air dispersion modeling in the atmosphere, 8:23071 (R:US)
Field Tests
Large-scale hazardous gas release experiments, 8:23069 (R:US)
Mathematical Models
Predicting hazards from large spills of liquefied gases, 8:23067 (RA:US)
Remote Sensing
BAGI: a technique for the detection and tracking of large gas clouds, 8:23070 (R:US)
Spatial Distribution
Denser-than-air dispersion modeling in the atmosphere, 8:23071 (R:US)
Predicting hazards from large spills of liquefied gases, 8:23067 (RA:US)
SLAB: a time-dependent computer model for the dispersion of heavy gases released in the atmosphere, 8:23068 (R:US)
GAS STATIONS
See GASOLINE SERVICE STATIONS
GAS TURBINE POWER PLANTS
Performance
Gas-Turbine Evaluation (GATE) Computer Program: thermodynamic cycles, methods, and sample cases. Final report, 8:23417 (R:US)
GAS TURBINES
Combustors
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
Corrosion
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
Materials
Directionally solidified eutectic superalloys for stationary gas turbines, 8:23407 (R:DE:In German)
Performance
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
Gas-Turbine Evaluation (GATE) Computer Program: thermodynamic cycles, methods, and sample cases. Final report, 8:23417 (R:US)
Protective Coatings
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
GAS WELLS
See NATURAL GAS WELLS
GASEOUS EFFLUENTS
See GASEOUS WASTES
GASEOUS WASTES
See also EXHAUST GASES
FLUE GAS
Waste Processing
Process for removal of organic solvents (Japanese Patent), 8:24054 (TG:US)
GASES
See also ELECTRON GAS and FERMI GAS.
See also AIR
EXHAUST GASES
FUEL GAS
SYNTHESIS GAS
Chapman-Enskog Theory
Comment on: On the Chapman—Enskog solution method for mixtures [B. C. Eu, J. Chem. Phys. 74, 6373 (1981)], 8:24752 (J:US)
Diffusion
Effect of a two-dimensional obstacle on the dispersion of a heavier-than-air gas in an atmospheric boundary layer, 8:24243 (R:US)
Monte Carlo simulation of diffusion of gases in a porous solid: Calculations for a new class of solids, 8:24742 (J:US)
Thermodynamic Properties
Fortran computer-code package for the evaluation of gas-phase viscosities, conductivities, and diffusion coefficients (CHEMKIN), 8:24137 (R:US)
Transport Theory
Comment on: On the Chapman—Enskog solution method for mixtures [B. C. Eu, J. Chem. Phys. 74, 6373 (1981)], 8:24752 (J:US)
Viscosity
Fortran computer-code package for the evaluation of gas-phase viscosities, conductivities, and diffusion coefficients (CHEMKIN), 8:24137 (R:US)
GAS-INSULATED SUBSTATIONS
Lightning Arresters
Metal-oxide surge arresters for gas-insulated systems, Phases I and II. Final report, 8:23438 (R:US)
GAS-INSULATED TRANSFORMERS
Design
Compact gas-insulated transformer. Thirteenth quarterly report, 8:23433 (R:US)
Manufacturing
Compact gas-insulated transformer. Thirteenth quarterly report, 8:23433 (R:US)
GASOLINE
Allocations
Allegations of improper supplier practices affecting gasoline lines at independent stations, 8:23042 (R:US)
Chemical Reaction Yield
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Yields
Synthesis of liquids and pipeline gas by Fischer-Tropsch, 8:23221 (R:US)
GASOLINE ENGINES
See INTERNAL COMBUSTION ENGINES
GASOLINE PLANTS
Design
Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant. Final report (W.R. Grace project coal-gasification-methanol-gasoline project at Baskett, KY), 8:22922 (R:US)
Engineering
Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant. Final report (W.R. Grace project coal-gasification-methanol-gasoline project at Baskett, KY), 8:22922 (R:US)
GASOLINE SERVICE STATIONS
Supply Disruption
Allegations of improper supplier practices affecting gasoline lines at independent stations, 8:23042 (R:US)
GENE MUTATIONS
Calculation Methods
Development of methods and criteria for deciding whether specific-locus mutation-rate data indicate a positive, negative, or inconclusive result, 8:24330 (RA:US)
Genetic Mapping
Analysis of the albino-locus region of the mouse: characterization of 34 deficiencies, 8:24333 (RA:US)
GENERATORS (ELECTRIC)
See ELECTRIC GENERATORS
GENERATORS (PULSE)
See PULSE GENERATORS

GENERATORS (STEAM)
See STEAM GENERATORS
GENETIC MAPPING
Genetic basis of mutagenesis and carcinogenesis, 8:24418 (RA:US)
GEOCHEMICAL SURVEYS
Computer Graphics
PLANMAP.REV1; plots geochemical data in plan (UNIVAC1108,1100; FORTRAN V (97%) and Assembly language (3%)), 8:23365 (R:US)
GEOLOGIC ENGINEERING
See ENGINEERING GEOLOGY
GEOMORPHOLOGY
Computer Codes
BLOCKS: a block-motion code for geomechanics studies, 8:24493 (R:US)
Equations of Motion
BLOCKS: a block-motion code for geomechanics studies, 8:24493 (R:US)
GEOPHONES
See SEISMIC DETECTORS
GEOPHYSICAL SURVEYS
See also SEISMIC SURVEYS
Induced Polarization Logging
IP2D.REV1; resistivity & induced-polarization (UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%)), 8:23367 (R:US)
Resistivity Logging
SLUMB.REV0; one-dimensional Schlumberger inversion program (UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%)), 8:23364 (R:US)
GEOTHERMAL AREAS
See GEOTHERMAL FIELDS
GEOTHERMAL DISTRICT HEATING
Computerized Simulation
GEOCITY; geothermal district heating economics (CDC CYBER74;CDC6600,7600; FORTRAN IV), 8:23384 (R:US)
Design
Design of the Klamath Falls geothermal district heating network, 8:23386 (J:US)
Design of a geothermal district heating system for Boise, Idaho, 8:23387 (J:US)
Economics
Design of a geothermal district heating system for Boise, Idaho, 8:23387 (J:US)
GEOTHERMAL ENERGY
Bibliographies
Abstracts of final reports of the first R and D programme on geothermal energy, 8:23361 (R:US)
GEOTHERMAL ENERGY CONVERSION
Feasibility Studies
Geothermal probabilistic cost study, 8:23376 (R:US)
GEOTHERMAL FIELDS
Drill Cores
SECTION.REV1; plot geochemical drill hole data (UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%)), 8:23379 (R:US)
GEOTHERMAL FLUIDS
Measuring Instruments
Development of an instrument to measure the concentration of noncondensable gases in geothermal discharges. Final report, October 1, 1978-September 30, 1979, 8:23373 (R:US)
GEOTHERMAL HEATING
See also GEOTHERMAL DISTRICT HEATING
Economic Analysis
Geothermal heating, 8:23385 (R:US)
GEOTHERMAL POWER PLANTS
Commercialization
Five-megawatt geothermal-power pilot-plant project, 8:23375 (R:US)
Life-Cycle Cost
GCFM5.0; geothermal field & power plant costs (IBM370,303x; FORTRAN IV), 8:23378 (R:US)
Program Management
Five-megawatt geothermal-power pilot-plant project, 8:23375 (R:US)
Technology Assessment
Energy technology data handbook. Vol. 1, 8:23423 (R:DE)
GEOTHERMAL REGIONS
See GEOTHERMAL FIELDS
GEOTHERMAL SYSTEMS
See also HOT-DRY-ROCK SYSTEMS
Economics
Geothermal probabilistic cost study, 8:23376 (R:US)
Heat Transfer
SCHAFF; heat & water transfer in porous media (CDC7600; FORTRAN IV), 8:23362 (R:US)
Natural Convection
SCHAFF; heat & water transfer in porous media (CDC7600; FORTRAN IV), 8:23362 (R:US)
Thermal Energy Storage Equipment
SOLTES1; thermal energy systems simulation (CDC6600,7600; FORTRAN IV (99%) and COMPASS (1%)), 8:23663 (R:US)
GEOTHERMAL WELLS
Mathematical Models
Quasi-steady model for predicting temperature of aqueous foams circulating in geothermal wellbores, 8:23382 (R:US)
Testing
City of North Bonneville, Washington: Geothermal Exploration Project, production test well, Phase II. Final report, 8:23380 (R:US)
Water Pumps
Raft river geothermal pump disassembly and inspection, 8:23381 (R:US)
Well Drilling
City of North Bonneville, Washington: Geothermal Exploration Project, production test well, Phase II. Final report, 8:23380 (R:US)
Well Temperature
Quasi-steady model for predicting temperature of aqueous foams circulating in geothermal wellbores, 8:23382 (R:US)
GERMAN FEDERAL REPUBLIC
See FEDERAL REPUBLIC OF GERMANY
GERMANIUM
Electron Channeling
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
Positron Channeling
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
GERMANIUM ALLOYS
Vacancies
Positron-annihilation measurements of vacancy formation in Ni and Ni(Ge), 8:23941 (R:US)
Vacancy formation in Ni and Ni(Ge), 8:23933 (R:US)
GERMANIUM IONS
Emission Spectra
Spectra of germanium and selenium in the 50-350 A region from the PLT tokamak plasma, 8:24770 (R:US)
GERMANY (FEDERAL REPUBLIC)
See FEDERAL REPUBLIC OF GERMANY
GETTERS
Materials used for the purification of vacuum atmospheres; see also the specific materials.
Design
Design and test results of an in-torus zirconium/aluminum getter pump system for PDX, 8:25211 (J:US)
GIANT CELLS
See TUMOR CELLS
GINNA-1 REACTOR
Reactor Materials
Examination of Tube Samples 21-46 and 28-45 from the Ginna Nuclear Plant for intergranular attack, 8:23500 (R:US)
Steam Generators
Examination of Tube Samples 21-46 and 28-45 from the Ginna Nuclear Plant for intergranular attack, 8:23500 (R:US)
GIROMILL TURBINES
Design
McDonnell 40-kW Giromill wind system: Phase I. Design and analysis. Volume I. Executive summary, 8:23395 (R:US)

GLASS
See also BOROSILICATE GLASS
Fabrication
New method for the preparation of fast-conducting, reactive-glass systems, 8:24029 (R:US)
Leaching
High-temperature leaching of an actinide-bearing, simulated high-level waste glass, 8:23159 (R:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Temperature Effects
High-temperature leaching of an actinide-bearing, simulated high-level waste glass, 8:23159 (R:US)
GLASS INDUSTRY
Heat Recovery
Heat-exchanger needs for recovering waste heat in the glass-making industry. Final report, 8:23861 (R:US)
GLAUBER'S SALT
See SODIUM SULFATES
GLOVEBOXES
GLOVE CHANGE ANALYSIS SYSTEM; glove data base (IBM360; COBOL with TOTAL DBMS (95%) and Assembler (5%)), 8:24091 (R:US)
Cleaning
Compact tritium removal equipment for air cleanup of glove box, 8:25124 (J:US)
Design
Maintenance glove box for sealed master-slave manipulators, 8:24131 (J:US)
Tritium Recovery
New process to remove tritium from glove box atmospheres (TROC (Tritium Removal with Organic Compounds) Process), 8:25125 (J:US)
GLUCOSE
Uptake
Multiphasic kinetics for D-glucose uptake by assemblages of natural marine bacteria, 8:24273 (J:DE)
GLUONS
Bound State
Brookhaven: glueballs, 8:24603 (J:XC)
GLYCINE HISPIDA
Productivity
Approach to modelling vegetation yield reduction from point-source emissions of sulfur dioxide, 8:24400 (R:US)
Effect of NO_2 and SO_2 alone and in combination on the productivity of field-grown soybeans, 8:24406 (R:US)
GLYCOLS
Corrosive Effects
Corrosion problems associated with solar fluid and components, 8:23315 (R:US)
GOLD
Electric Conductivity
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R:US)
Magnetic Properties
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R:US)
Superconductivity
Superconductivity in Au-Cr-Au and Ag-Pd-Ag epitaxial metal film sandwiches, 8:23944 (R:US)
GOLD 197 TARGET
Argon 36 Reactions
Indication of preequilibrium emission in deep inelastic Ar + Au collisions, 8:24695 (RA:DE:In German)
Carbon 12 Reactions
Light particle emission from the reaction of ^{13}C with ^{58}Ni and ^{197}Au at 25 MeV per nucleon, 8:24666 (RA:DE:In German, English)
Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution, 8:24649 (RA:DE:In German)
Fission
Fission fragment angular correlation in 300 MeV ^{20}Ne induced reactions on heavy targets, 8:24686 (RA:DE:In German, English)
Neon 20 Reactions
Balance between light-fragment and fission inclusive cross sections of the ^{20}Ne + ^{197}Au reaction between 7.5 and 20 MeV/nucleon, 8:24653 (RA:DE:In German, English)
Dissociation of 15 MeV/nucleon ^{20}Ne in collisions with ^{197}Au: direct reactions leading to particle-emitting states, 8:24693 (RA:DE:In German, English)
Evidence for non-sequential emission of fast α-particles in deep-inelastic ^{20}Ne + ^{197}Au collisions at 14.5 MeV/nucleon, 8:24694 (RA:DE:In German, English)
Light charged-particle emission from ^{197}Au + ^{20}Ne, 8:24700 (RA:DE:In German, English)
Search for 'fast fission' at the system ^{20}Ne + ^{197}Au, 8:24696 (RA:DE:In German, English)
Proton Reactions
Mass-yield distribution in proton and heavy-ion induced target fragmentation processes, 8:24691 (RA:DE:In German, English)
GOODS AND SERVICES
Energy Accounting
Marginal energy cost of goods and services. Final report, 8:23037 (R:US)
Procurement
Administration of selected support-service contracts, 8:25226 (R:US)
Excessive costs incurred by the Strategic Petroleum Reserve program for rental and other services, 8:23722 (R:US)
GOVERNMENT POLICIES
See also ENERGY POLICY
ENVIRONMENTAL POLICY
Decision Making
State-local relations and urban technology: a study in intergovernmental decision making - executive summary, 8:24304 (R:US)
State-local relations and urban technology: a study in intergovernmental decision making, 8:24305 (R:US)
GRANITES
Cracks
Microcracks and energy. Progress report, 1 March 1982-28 February 1983, 8:23096 (R:US)
Radionuclide Migration
Microcracks and energy. Progress report, 1 March 1982-28 February 1983, 8:23096 (R:US)
GRANULAR BED FILTERS
Research Programs
Advanced environmental control technology , 8:22952 (R:US)
GRANULOCYTES
See LEUKOCYTES
GRAPHITE
Clathrates
Raman measurements of folded interlayer shearing phonons in KC_{12}/sub n/ (n = 2 approx. 6), 8:24032 (R:US)
GRAPHITE MODERATOR
See GRAPHITE
GREAT LAKES REGION
See FEDERAL REGION V
GREECE
Volcanoes
Textural analysis of tephra from a rhyodacitic eruption sequence, Thira (Santorini), Greece, 8:24490 (R:US)
GREENHOUSES
See also ATTACHED GREENHOUSES
Heat Storage
Solar energy model Goennebek, 8:23314 (R:DE:In German)
Solar Space Heating
Solar energy model Goennebek, 8:23314 (R:DE:In German)
GROUND WATER
Chemical Analysis
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R:IT)
Hydrologic resource research, 8:23091 (RA:US)
Flow Models
Two-dimensional, steady-state model of ground-water flow, Nevada Test Site and vicinity, Nevada-California, 8:24484 (R:US)

Fluorescence Spectroscopy
Unique developments in laser-induced fluorescence fluorimetry (LIFF), 8:24294 (RA:US)
Geochemical Surveys
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesna NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R:US)
Heat Flow
SWIFT; waste-isolation flow & transport model (CDC7600; FORTRAN IV), 8:23377 (R:US)
Hydrology
OPTRM; hydrologic transport with optimization (IBM360,370; FORTRAN IV (96%) AND BAL (4%)), 8:24276 (R:US)
SWIFT; waste-isolation flow & transport model (CDC7600; FORTRAN IV), 8:23377 (R:US)
Laser Spectroscopy
Unique developments in laser-induced fluorescence fluorimetry (LIFF), 8:24294 (RA:US)
Radiochemical Analysis
Distribution and possible causes of radionuclides in groundwaters of Missouri, 8:24296 (J:US)
Radionuclide Migration
Actinide-solubility controls in performance assessment of nuclear-waste repositories, 8:23168 (R:US)
Influence of leach rate and other parameters on groundwater migration, 8:23184 (R:US)
Mathematical model for evaluating the suitability of a low-level radioactive waste site, 8:23119 (R:US)
Radionuclide migration of the elements I, Sr, Cs and Ce in subsurface loose rocks, 8:24263 (R:DE:In German)

GROUNDS
See ELECTRIC GROUNDS

GROUNDS (ELECTRIC)
See ELECTRIC GROUNDS

GROUND-WATER RESERVES
See AQUIFERS

GULF OF MEXICO
Energy Source Development
Proceedings of a workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of Outer Continental Shelf development, 8:23040 (R:US)

GUM ACACIA
Mutagen Screening
Use of the mouse heritable translocation test in testing chemicals (Ammoniated glycerrhizin; butylated hydroxytoluene; gum arabic; ethylene oxide), 8:24430 (RA:US)

GUM ARABIC
See GUM ACACIA

GYROTRONS
See MICROWAVE AMPLIFIERS

H

HADRON REACTIONS
Bag Model
Quark bags, 8:24613 (RA:US)

HADRON-HADRON INTERACTIONS
Interaction Range
Joining the quark and hadron exchange descriptions of strong interactions, 8:24615 (RA:US)
Potentials
Joining the quark and hadron exchange descriptions of strong interactions, 8:24615 (RA:US)
Quark Model
What can be learned from strong elementary hadronic interactions at and below 16 GeV, 8:24622 (RA:US)

HAFNIUM 166
High Spin States
High-spin rotational states in ^{166}Hf and ^{170}W, 8:24689 (RA:DE:In German, English)

HAFNIUM ALLOYS
Electronic Structure
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R:US)
Superconductivity
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R:US)

HALL GENERATORS
See MHD GENERATORS

HALOGEN COMPOUNDS
Only for inorganic compounds; see also other inorganic halogen compounds.
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)

HANDLING (DATA)
See DATA PROCESSING

HANFORD RESERVATION
Environmental Impact Statements
Addendum to Environmental Impact Statement. Operation of PUREX and Uranium Oxide Plant Facilities, 8:24308 (R:US)

HARD COAL
See BLACK COAL

HASTELLOY C
Corrosion
Corrosion of materials in a clay environment, 8:23145 (RA:DE)

HAULAGE EQUIPMENT
See also CONVEYORS
Alarm Systems
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Automation
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Brakes
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Communications
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Comparative Evaluations
Continuous haulage update, 8:22972 (R:US)
Computerized Simulation
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Control Equipment
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Design
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Economic Analysis
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Performance Testing
Continuous haulage update, 8:22972 (R:US)
Safety Engineering
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Systems Analysis
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)

HAYNES 188 ALLOY
Corrosion
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
Failures
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)

HB ROBINSON-2
See ROBINSON-2 REACTOR

HCDA
See REACTOR CORE DISRUPTION

H-COAL PROCESS
Pilot Plants
Overview of coal liquefaction in the US Department of Energy, 8:22917 (R:US)
Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R:US)
Waste Water
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R:US)
HD 8077
See NICKEL BASE ALLOYS
HDO
See DEUTERIUM COMPOUNDS
HEAVY WATER
HE-3 COUNTERS
Binary Mixtures
New gas mixture improves performance of ^{3}He neutron counters, 8:24207 (J:NL)
HEADING MACHINES
Air Pollution Abatement
Development of dry-filter dust extractors to reduce dust development during operation of heading machines, 8:24229 (R:DE:In German)
HEALTH PHYSICS
See RADIATION PROTECTION
HEART
Injuries
Definitive studies on pole-top resuscitation. Final report, 8:24481 (R:US)
HEART DISEASE
See CARDIOVASCULAR DISEASES
HEAT DISSIPATION
See DIFFUSION
ENVIRONMENTAL TRANSPORT
HEAT TRANSFER
HEAT ENGINES
See also INTERNAL COMBUSTION ENGINES
STIRLING ENGINES
Materials
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Research Programs
Topics in finite time thermodynamics, 8:24158 (R:US)
Thermodynamics
Topics in finite time thermodynamics, 8:24158 (R:US)
HEAT EXCHANGERS
See also FLUIDIZED BED HEAT EXCHANGERS
RADIATORS
Biological Fouling
OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J:US)
Corrosion
OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J:US)
Damage
DOE/ANL/HTRI heat-exchanger-tube vibration data bank, 8:23846 (R:US)
Design
Ceramic-heat-exchanger technology. Final report, 8:23418 (R:US)
Fouling
Ceramic-heat-exchanger technology. Final report, 8:23418 (R:US)
Friction Factor
Friction factor correlation for the offset strip-fin matrix, 8:24104 (R:US)
Prediction of the friction factor for the offset strip-fin matrix, 8:24105 (R:US)
Heat Transfer
Friction factor correlation for the offset strip-fin matrix, 8:24104 (R:US)
Thermomechanical analysis of a SPX 1 type sodium-air heat exchanger, 8:23515 (R:IT:IT)
Hydraulics
Thermomechanical analysis of a SPX 1 type sodium-air heat exchanger, 8:23515 (R:IT:IT)
Information Needs
Heat-exchanger needs for recovering waste heat in the glass-making industry. Final report, 8:23861 (R:US)
Laminar Flow
Prediction of the friction factor for the offset strip-fin matrix, 8:24105 (R:US)
Materials
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Mechanical Vibrations
DOE/ANL/HTRI heat-exchanger-tube vibration data bank, 8:23846 (R:US)
Performance
Ceramic-heat-exchanger technology. Final report, 8:23418 (R:US)
Investigation of combined heat and mass transfer from a wet heat exchanger. Part 1. Formulation of an approximate heat/mass transfer model for calculating the performance of heat exchangers in dry/wet operation, 8:24110 (R:US)
HEAT PIPES
Design
Heat pipe development for high temperature recuperator application, 8:24115 (J:GB)
Performance Testing
Analytical and experimental investigations of sodium heat pipes and thermal energy storage systems. Final report oct 80-sep 81, 8:24083 (R:US)
Waste Heat Utilization
Ceramic heat pipes for high-temperature heat recovery, 8:23866 (J:GB)
HEAT PUMPS
See also AIR SOURCE HEAT PUMPS
CHEMICAL HEAT PUMPS
GAS HEAT PUMPS
SOLAR-ASSISTED HEAT PUMPS
Compressors
Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23854 (R:DE:In German)
Control Systems
Energy conservation evaluation of two variable interval time/temperature heat pump defrost control strategies, 8:23836 (J:US)
Defrosting
Energy conservation evaluation of two variable interval time/temperature heat pump defrost control strategies, 8:23836 (J:US)
Design
Heat pump apparatus, 8:23360 (P:US)
Energy Analysis
Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses, 8:23796 (R:DE:In German)
Pipes
Development of an optimizing method for the design of pipe systems in the ground used as heat source for heat pumps, 8:23855 (R:DE:In German)
HEAT RECOVERY
Economic Analysis
Economic evaluation of competing industrial waste-heat-recovery technologies, 8:23856 (R:US)
Rankine Cycle Power Systems
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R:US)
HEAT RECOVERY EQUIPMENT
Heat Transfer
Heat transfer in slagging MHD radiant boilers, 8:23770 (R:US)
Materials
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
HEAT RESISTING ALLOYS
See also STAINLESS STEEL-304
STAINLESS STEEL-310
STAINLESS STEEL-316
Corrosion
Corrosion of materials in a clay environment, 8:23145 (RA:DE)

HEAT SINKS
Materials Testing
Important material considerations in INTOR, 8:24820 (R:US)
HEAT SOURCES (RADIOISOTOPE)
See RADIOISOTOPE HEAT SOURCES
HEAT STORAGE
See also LATENT HEAT STORAGE
SENSIBLE HEAT STORAGE
THERMOCHEMICAL HEAT STORAGE
Bibliographies
Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975, 8:23323 (R:US)
HEAT STORAGE DEVICES
See THERMAL ENERGY STORAGE EQUIPMENT
HEAT STORAGE SYSTEMS
See THERMAL ENERGY STORAGE EQUIPMENT
HEAT TRANSFER
Computer Codes
TRUMP; transient & steady state temperature distribution (IBM360,370;CDC7600; FORTRAN IV (95%) and BAL (5%) (IBM); FORTRAN IV (CDC)), 8:24135 (R:US)
HEAT TRANSMISSION
See HEAT TRANSFER
HEATER OIL
See HEATING OILS
HEATERS
Corrosion
Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA:US)
Heat Transfer
Cryogenic voltage withstand and heat transfer tests for the General Electric large coil turn heaters, 8:25009 (J:US)
HEATING LOAD
Computer Codes
DOE2.1A; building energy consumption analysis (CDC7600,6600,CYBER175;IBM370,303x;DEC10,20; FORTRAN (99.9%) and COMPASS (0.1%) for the CDC version. The IBM and DEC versions are all FORTRAN.), 8:23794 (R:US)
HEATING OILS
Combustion Products
Shoreside boiler demonstration of fuel-water emulsions. Final report Mar 80-Aug 82, 8:23047 (R:US)
Supply and Demand
EIA symposium on short-term energy forecasting. Summary of the proceedings, 8:23721 (R:US)
HEATING SYSTEMS
See also SOLAR HEATING SYSTEMS
Comparative Evaluations
Low-temperature heat supply with special consideration to a variety of new technologies, 8:23817 (R:DE:In German)
Control
Heat energy consumption and intermittent heating, 8:23800 (R:DE:In German)
Economic Analysis
Low-temperature heat supply with special consideration to a variety of new technologies, 8:23817 (R:DE:In German)
Energy Efficiency
Heat energy consumption and intermittent heating, 8:23800 (R:DE:In German)
Optimization
Insulation of exterior walls, placement of radiators and room climate, 8:23798 (R:DE:In German)
HEAVY ION ACCELERATORS
Includes combined accelerator types for heavy ion acceleration.
See also HILACS
VICKSI
Test Facilities
Development of the rf linear accelerator test bed for heavy-ion fusion, 8:24822 (R:US)
HEAVY ION LINEAR ACCELERATORS
See HILACS
HEAVY ION REACTIONS
See also ARGON 36 REACTIONS
ARGON 40 REACTIONS
CARBON 12 REACTIONS
CARBON 13 REACTIONS
DEEP INELASTIC HEAVY ION REACTIONS
IRON 56 REACTIONS
KRYPTON 84 REACTIONS
KRYPTON 86 REACTIONS
NEON 20 REACTIONS
NEON 22 REACTIONS
OXYGEN 16 REACTIONS
TIN 120 REACTIONS
XENON 132 REACTIONS
Coherent Scattering
Partial coherence in heavy-ion reactions, 8:24710 (RA:DE:In German, English)
Coulomb Excitation
Multiple Coulomb excitation of very heavy systems within the classical S-matrix theory, 8:24709 (RA:DE:In German, English)
Gluons
Highly relativistic nucleus-nucleus collisions: The central rapidity region, 8:24626 (J:US)
Inelastic Scattering
Spin-orbit potentials from reaction calculations of spin-flip, 8:24713 (RA:DE:In German, English)
Intermediate Resonance
Resonances in s-d shell nuclei, 8:24651 (R:US)
Nuclear Models
Folding methods in heavy-ion physics, 8:24711 (RA:DE:In German)
Potential Scattering
Spin-orbit potentials from reaction calculations of spin-flip, 8:24713 (RA:DE:In German, English)
Spallation
Mass-yield distribution in proton and heavy-ion induced target fragmentation processes, 8:24691 (RA:DE:In German, English)
HEAVY OILS
See PETROLEUM
HEAVY WATER
Neutron Transport
Re-evaluation of the neutron scattering dynamics in heavy water, generation of multigroup cross sections for THERM-126, 8:24724 (R:DE)
HEAVY WATER COOLANT
See HEAVY WATER
HEAVY WATER MODERATOR
See HEAVY WATER
HELIOS FACILITY
Operation
Helios: a 15 TW carbon dioxide laser-fusion facility, 8:24915 (J:US)
HELIOSTATS
Distribution
Heliostat field layout for solar thermal power plants, 8:23304 (R:US)
Shading
Thermodynamic model for a central receiver of a solar plant with partial shading of the heliostat field, 8:23300 (R:DE:In German)
HELIOTRON
Breeding Blankets
Nuclear design of Heliotron fusion reactor blankets (II), 8:24974 (J:US)
HELIUM
Correlation Functions
New look at correlations in atomic and molecular systems. I. Application of fermion Monte Carlo variational method, 8:24564 (J:US)
Emission Spectra
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion Spectroscopy
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion-Atom Collisions
Charge distributions of recoil ions, 8:24537 (RA:DE:In German)
Investigation of the asymmetry of the charge transfer into continuum in collisions of 155 MeV Ne^{10+} in He, 8:24539 (RA:DE:In German)
Second Born calculation for electron capture, 8:24529 (RA:DE:In German, English)

Ionization
Charge distributions of recoil ions, 8:24537 (RA:DE:In German)
Investigation of the asymmetry of the charge transfer into continuum in collisions of 155 MeV Ne^{10+} in He, 8:24539 (RA:DE:In German)
HELIUM 3
Hyperfine Structure
Hyperfine structures of the nd $^1D(n = 3 - 8)$ states of ^3He I, 8:24518 (R:US)
Ion Spectroscopy
Hyperfine structures of the nd $^1D(n = 3 - 8)$ states of ^3He I, 8:24518 (R:US)
Specific Heat
New data on the heat capacity of liquid ^3He, 8:24570 (R:US)
HELIUM 4 REACTIONS
See ALPHA REACTIONS
HELIUM HYDRIDES
Dissociation
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion Spectroscopy
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
HELIUM IONS
Branching Ratio
Radiative charge transfer in collisions of He^{2+} ions and ground-state H atoms, 8:24553 (J:US)
Emission Spectra
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion Collisions
Electron capture into Rydberg states of fast ion beams following gas and foil excitation, 8:24542 (RA:DE:In German, English)
Ion Spectroscopy
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion-Atom Collisions
Radiative charge transfer in collisions of He^{2+} ions and ground-state H atoms, 8:24553 (J:US)
Ion-Ion Collisions
Electron capture in ion-atom collisions at intermediate collision energies, 8:24530 (RA:DE:In German)
HERBICIDES
Comparative Evaluations
Transmisson-Facilities Vegetation-Management Program: Bonneville Power Administration. Draft environmental impact statement, 8:24309 (R:US)
HEXAHYDROPYRIDINES
See PIPERIDINES
HIGH ENERGY PHYSICS
Use only for articles of a very broad nature such as an annual research program, etc.
Experiment Planning
Recent results and physics at a future high intensity facility of $E \leqq 31$ GeV, 8:24600 (RA:US)
Meetings
High energy spin physics - 1982, 8:24574 (B:US)
Proceedings of the workshop on nuclear and particle physics at energies up to 31 GeV: new and future aspects, 8:24578 (R:US)
Reviews
Recent results and physics at a future high intensity facility of $E \leqq 31$ GeV, 8:24600 (RA:US)
HIGH ENERGY RADIOTHERAPY
See RADIOTHERAPY
HIGH EXPLOSIVES
See CHEMICAL EXPLOSIVES
HIGH FLUX NEUTRON SOURCE FACILITY
See NEUTRON SOURCE FACILITIES
HIGH SPIN STATES
Nuclear Deformation
Shell structure at high spin and the influence on nuclear shapes, 8:24681 (R:US)
Nuclear Models
High spins in gamma-soft nuclei, 8:24704 (R:US)
HIGH TEMPERATURE GAS COOLED AND GRAPHITE
See HTGR TYPE REACTORS
HIGH-FREQUENCY HEATING
See also ECR HEATING
ICR HEATING
Electronic Equipment
High voltage rf coaxial vacuum bushing design considerations, 8:25095 (J:US)
Hybrid Resonance
Mechanical aspects of the design of a lower hybrid frequency grill launcher for the Joint European Torus (J.E.T.), 8:25094 (J:US)
HIGH-LEVEL RADIOACTIVE WASTES
Leaching
Hydroxylated ceramic waste forms and the absurdity of 'leach tests', 8:23128 (RA:DE)
HIGH-VOLTAGE PULSE GENERATORS
Switching Circuits
Control of energy transfer with an inductor-convertor bridge, 8:24102 (R:US)
HIGHWAYS
See ROADS
HILACS
See also SUPERHILAC
Electroplating
Development of copper electroplating for large accelerating structures for heavy ion fusion, 8:24164 (J:US)
Test Facilities
Development of copper electroplating for large accelerating structures for heavy ion fusion, 8:24164 (J:US)
HOG FUEL
See WOOD WASTES
HOLMIUM 165 TARGET
Fission
Fission fragment angular correlation in 300 MeV ^{20}Ne induced reactions on heavy targets, 8:24686 (RA:DE:In German, English)
Iron 56 Reactions
Emission of light charged particles in the reaction $^{165}Ho + {}^{56}Fe$, 8:24685 (RA:DE:In German, English)
Neon 20 Reactions
Neutron emission in the reaction $^{165}Ho + {}^{20}Ne$, 8:24684 (RA:DE:In German, English)
HORMONES
Genetic Effects
Regulation of gene expression, 8:24449 (RA:US)
Genetic Mapping
Genetic basis of mutagenesis and carcinogenesis, 8:24418 (RA:US)
HOSPITALS
Energy Conservation
Cost containment in hospitals through energy conservation (case histories of energy conservation based on a national survey of selected hospitals), 8:23708 (R:US)
Energy Consumption
Energy conservation in hospitals. Analysis of data for Maine and Ohio, 1978-1981, 8:23810 (R:US)
HOT CELLS
Remote Handling Equipment
Role of mockup testing in the Hot Fuel Examination Facility remote operations, 8:24103 (R:US)
HOT GAS CLEANUP
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program, 8:23782 (R:US)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program, 8:23781 (R:US)
Research Programs
Advanced environmental control technology , 8:22952 (R:US)
HOT PLASMA
Distribution Functions
Synchrotron emission from a relativistic loss-cone distribution with application to the ELMO Bumpy-Torus Experiment, 8:24785 (J:US)

Fluid Flow
Stability of parallel flow of a multi-component cylindrical plasma to electrostatic perturbations, 8:24804 (J:GB)
Magnetic Field Configurations
Synchrotron emission from a relativistic loss-cone distribution with application to the ELMO Bumpy-Torus Experiment, 8:24785 (J:US)
Stability
Stability of parallel flow of a multi-component cylindrical plasma to electrostatic perturbations, 8:24804 (J:GB)
Synchrotron Radiation
Synchrotron emission from a relativistic loss-cone distribution with application to the ELMO Bumpy-Torus Experiment, 8:24785 (J:US)

HOT-DRY-ROCK SYSTEMS
Well Logging Equipment
Analysis and thermal-design improvements of downhole tools for use in hot-dry wells, 8:23372 (R:US)

HOUSES
Attached Greenhouses
Solar-energy-system performance evaluation: Hullco Construction Company single-family residence, Prescott, Arizona, May 1978-April 1979, 8:23334 (R:US)
Direct Gain Systems
Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979, 8:23337 (R:US)
Solar-energy-system performance evaluation: Hullco Construction Company single-family residence, Prescott, Arizona, May 1978-April 1979, 8:23334 (R:US)
Solar-energy-system performance evaluation: Living Systems single-family residence, Davis, California, October 1978-March 1979, 8:23336 (R:US)
Drum Walls
Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979, 8:23337 (R:US)
Energy Conservation
Impact of energy-conserv retrofits on indoor air quality in residential housing. Paper 81.22.1, 8:23832 (J:US)
Energy Consumption
Study of the effect that building insulation has on the actual fuel consumption. Final report, 8:23322 (R:XE:FR)
Heat Pumps
Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses, 8:23796 (R:DE:In German)
Heating Systems
Low-temperature heat supply with special consideration to a variety of new technologies, 8:23817 (R:DE:In German)
Indoor Air Pollution
Impact of energy-conserv retrofits on indoor air quality in residential housing. Paper 81.22.1, 8:23832 (J:US)
Passive Solar Water Heaters
Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979, 8:23337 (R:US)
Solar Heating Systems
Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses, 8:23796 (R:DE:In German)
Solar Space Heating
Solar-energy-system-performance evaluation: Perl-Mack Enterprises, Inc., single-family residence, Denver, Colorado, April 1978-March 1979, 8:23332 (R:US)
Solar-energy-system performance evaluation: Ortiz and Reill Developers, Inc., Lot 8 single-family residence, Escondido, California, October 1978-March 1979, 8:23338 (R:US)
Solar-energy-system performance evaluation: Alpha Construction Co. single-family residence, Canton, Ohio, October 1978-March 1979, 8:23333 (R:US)
Solar-energy-system performance evaluation: Washington Natural Gas Company, Kirkland, Washington, January 1979-March 1979, 8:23330 (R:US)
Solar-energy-system performance evaluation: J. D. Evans, Inc., House B, Columbia, Maryland, November 1978-March 1979, 8:23331 (R:US)
Study of the effect that building insulation has on the actual fuel consumption. Final report, 8:23322 (R:XE:FR)
Solar Water Heating
Solar-energy-system-performance evaluation: Perl-Mack Enterprises, Inc., single-family residence, Denver, Colorado, April 1978-March 1979, 8:23332 (R:US)
Solar-energy-system performance evaluation: Ortiz and Reill Developers, Inc., Lot 8 single-family residence, Escondido, California, October 1978-March 1979, 8:23338 (R:US)
Solar-energy-system performance evaluation: Alpha Construction Co. single-family residence, Canton, Ohio, October 1978-March 1979, 8:23333 (R:US)
Solar-energy-system performance evaluation: Washington Natural Gas Company, Kirkland, Washington, January 1979-March 1979, 8:23330 (R:US)
Solar-energy-system performance evaluation: J. D. Evans, Inc., House B, Columbia, Maryland, November 1978-March 1979, 8:23331 (R:US)
Thermal Insulation
Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses, 8:23796 (R:DE:In German)
Study of the effect that building insulation has on the actual fuel consumption. Final report, 8:23322 (R:XE:FR)
Weatherization
Impact of energy-conserv retrofits on indoor air quality in residential housing. Paper 81.22.1, 8:23832 (J:US)

HTGR TYPE REACTORS
Commercialization
HTGR applications program. Semiannual report for the period October 1, 1980-March 31, 1981, 8:23538 (R:US)
Fuel Particles
Production of spherical UO/sub 2/-UC/sub 2/ for nuclear fuel applications using thermochemical principles, 8:23108 (J:US)
Legal Aspects
Operating reactors licensing actions summary, 8:23527 (R:US)
Reactor Operation
Licensed operating reactors. Status summary report data as of October 31, 1982, 8:23523 (R:US)
Operating reactors licensing actions summary, 8:23527 (R:US)
Specifications
HTGR applications program. Semiannual report for the period October 1, 1980-March 31, 1981, 8:23538 (R:US)

HTO
See HEAVY WATER
TRITIUM COMPOUNDS

HUGENHOLTZ-PINES THEORY
See HYDROGEN

HUMAN CELLS
See ANIMAL CELLS

HUMAN FACTORS
Data Compilation
Human-reliability data bank for nuclear power plant operations. Volume 1. A review of existing human-reliability data banks, 8:23630 (R:US)

HUMAN FACTORS ENGINEERING
Cognitive models and computer aids for nuclear plant control room operators, 8:23559 (RA:US)
Cognitive models embedded in system simulation models, 8:23565 (RA:US)
Framework for modeling supervisory control behavior of operators of nuclear power plants, 8:23558 (RA:US)
Human cognition, 8:23562 (RA:US)
Outline of a model of human problem solving in failure situations, 8:23564 (RA:US)
Role of cognitive models of operators in the design, operation and licensing of nuclear power plants, 8:23557 (RA:US)
Role of conceptual models in nuclear power plant operation, 8:23563 (RA:US)
Rule-based approach to cognitive modeling of real-time decision making, 8:23566 (RA:US)
Using cognitive modeling to improve the man-machine interface (PWR), 8:23561 (RA:US)
Visual momentum: an example of cognitive models applied to interface design, 8:23560 (RA:US)

Meetings
Workshop on cognitive modeling of nuclear-plant control-room operators, 8:23556 (R:US)
Recommendations
Technical issues related to NUREG 0800, Chapter 18: Human Factors Engineering/Standard Review Plan, 8:23531 (R:US)

HUMAN POPULATIONS
See also A-BOMB SURVIVORS
Mutation Frequency
Area program in population genetics. Final report, November 1, 1975-August 31, 1982, 8:24366 (R:US)
Mutations
Area program in population genetics. Final report, November 1, 1975-August 31, 1982, 8:24366 (R:US)
Radiation Doses
GASPAR; evaluation of atmospheric releases (IBM370,303x; FORTRAN IV (98%) and Assembly language (2%)), 8:24248 (R:US)
LADTAP2; liquid pathway dose calculations (IBM360,370,303x;CDC7600,CYBER175; FORTRAN IV), 8:24293 (R:US)
UDAD; uranium dispersion & dosimetry model (IBM370,303x; FORTRAN IV (94%), PLL/I (4%), and Assembly language (2%). The only use of PL/I is the auxiliary plotting program, CONTOUR. The only use of Assembly language is the DATE, Gregorian calendar date routine), 8:23187 (R:US)
Radiation Protection
In-plant considerations for optimal offsite response to reactor accidents, 8:23574 (R:US)

HUMANS
See HUMAN POPULATIONS

HUMIDITY
Climates
Environmental data for sites in the National Solar Data Network, 8:23249 (R:US)
Data Compilation
Environmental data for sites in the National Solar Data Network, 8:23251 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23248 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23250 (R:US)

HYBRID ELECTRIC-POWERED VEHICLES
Legal Aspects
6th annual report to Congress for fiscal year 1982. Electric and Hybrid Vehicles Program, 8:23886 (R:US)
Market
Mission analysis of second cars to determine electric-vehicle suitability, 8:23883 (R:US)
Power Demand
Regional analysis of potential impacts of electric and hybrid vehicles on electric utilities, 8:23729 (R:US)
Research Programs
6th annual report to Congress for fiscal year 1982. Electric and Hybrid Vehicles Program, 8:23886 (R:US)
Specifications
Mission analysis of second cars to determine electric-vehicle suitability, 8:23883 (R:US)

HYBRID REACTORS
Breeding Blankets
Preconceptual design of a packed fluidized bed blanket for a fission suppressed thorium-fueled CTHR, 8:24976 (J:US)
Design
Fission-suppressed hybrid reactor: the fusion breeder, 8:24838 (R:US)

HYCSOS
See CHEMICAL HEAT PUMPS

HYDRAULIC EQUIPMENT
Data Acquisition Systems
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R:US)

HYDRAULIC FRACTURES
Crack Propagation
Numerical modeling of massive hydraulic fractures. First annual report, September 1980-August 1981, 8:24497 (R:US)

HYDRAULIC FRACTURING
Comparative Evaluations
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R:US)

HYDRAULIC RAMS
See PUMPS

HYDRAULIC TRANSPORT
Technology Assessment
Engineering approaches to the development of hydraulic transport, 8:24107 (R:US)

HYDRAULIC TURBINES
Technology Assessment
Sample survey of traditional water wheels and small water turbines in nepal: a preliminary report, 8:23242 (R:US)

HYDRIDES
See also HELIUM HYDRIDES
NICKEL HYDRIDES
VANADIUM HYDRIDES
ZIRCONIUM HYDRIDES
Thermochemical Heat Storage
Heat pump apparatus, 8:23360 (P:US)
Uses
Getting metal-hydrides to do what you want them to, 8:23215 (R:US)
Materials engineering of metal hydrides, 8:23216 (R:US)

HYDROCARBONS
See also BENZENE
BENZOPYRENE
POLYCYCLIC AROMATIC HYDROCARBONS
POLYENES
PYRENE
TOLUENE
Equations of State
Most general density-cubic equation of state: application to pure nonpolar fluids, 8:24072 (J:US)
Productivity
New sources for fuel and materials, 8:23282 (J:US)
Removal
Oil shale retorting and combustion system, 8:23083 (P:US)
Thermodynamic Properties
Most general density-cubic equation of state: application to pure nonpolar fluids, 8:24072 (J:US)
Yields
Synthesis of liquids and pipeline gas by Fischer-Tropsch, 8:23221 (R:US)

HYDROCHLORIC ACID
Corrosive Effects
Slow strain rate stress corrosion testing of boiler construction materials in synthetic flue gas at elevated temperatures, 8:23910 (RA:US)

HYDROCRACKING
Catalysts
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)

HYDROCYCLONES
See CYCLONE SEPARATORS

HYDRODYNAMICS
Computer Codes
HEMP; hydrodynamic elasticmagneto plastic flow (CDC7600; FORTRAN IV, LLL CHAT compiler), 8:24567 (R:US)
Mathematical Models
Halo-thermal simulation of the Dead Sea, 8:24503 (R:IL)

HYDROELECTRIC POWER
Monthly energy review, 8:23002 (R:US)
Charges
Unrecovered costs of the headwater benefits program, 8:23742 (R:US)
Cost Recovery
Unrecovered costs of the headwater benefits program, 8:23742 (R:US)
Program Management
Unrecovered costs of the headwater benefits program, 8:23742 (R:US)

HYDROELECTRIC POWER PLANTS
See also LOW-HEAD HYDROELECTRIC POWER PLANTS
MICRO-SCALE HYDROELECTRIC POWER PLANTS
PUMPED STORAGE POWER PLANTS
SMALL-SCALE HYDROELECTRIC POWER PLANTS

Economic Analysis
Investment analysis in electricity supply. Staff working paper, 8:23422 (R:US)
Feasibility Studies
Hydropower from Dutch rivers: a survey of potential and restrictions, 8:23241 (R:US:GE)
Hydropower study. Blackwater Dam, Webster, New Hampshire. Reconnaissance report, 8:23240 (R:US)
Operating Cost
PRODCOST; utility generating cost simulation (IBM360,370,303x; FORTRAN IV (97%) and Assembler (3%)), 8:23403 (R:US)
Unrecovered costs of the headwater benefits program, 8:23742 (R:US)
Optimization
STOPS; power system short-term optimization (IBM303x,360,370; FORTRAN IV), 8:23402 (R:US)
Power Generation
Electric power monthly (For July 1982), 8:23736 (R:US)
Electric power monthly (For November 1981), 8:23731 (R:US)
Electric power monthly (For April 1982), 8:23733 (R:US)
Electric power monthly (For June 1982), 8:23735 (R:US)
Electric power monthly (For May 1982), 8:23734 (R:US)
Electric power monthly (For February 1982), 8:23732 (R:US)
Electric power monthly, 8:23738 (R:US)
Electric power monthly (For October 1982), 8:23737 (R:US)
Electric Power Monthly, 8:23739 (R:US)
Site Selection
Investment analysis in electricity supply. Staff working paper, 8:23422 (R:US)
Technology Assessment
Energy technology data handbook. Vol. 1, 8:23423 (R:DE)

HYDROELECTRICITY
See HYDROELECTRIC POWER

HYDROGEN
Adsorption
Hydrides of oxygen-stabilized intermetallic phases (Zr_3V_3O; Ti_4M_5O/sub x/ (M = Fe, Co, Ni)), 8:23998 (R:US)
Hydrogen absorption and temperature programmed desorption (TPD) studies of iron- and chromium-substituted ZrV_2, 8:23214 (R:US)
Atom-Molecule Collisions
Applications of classical trajectory techniques to reactive scattering, 8:24566 (J:US)
Multichannel distorted wave Born approximation for reactive scattering, 8:24549 (J:US)
Third body efficiencies for collision-induced dissociation of diatomics. Rate coefficients for $H+H_2 \rightarrow 3H$, 8:24550 (J:US)
Chemical Reaction Kinetics
Quasiclassical trajectory (and variational transition state theory) study of the rates and temperature-dependent activation energies of the reactions $Mu+H_2$ (completely thermal) and H, D, and $Mu+H_2$ (v = 0, j = 2), 8:24079 (J:US)
Chemisorption
Chemisorptive discharge of hydrogen ions: An elementary step in hydrogen corrosion, 8:23954 (R:DE)
Combustion
A model for predicting containment response to hydrogen burns, 8:23654 (J:US)
Hydrogen combustion during degraded core accidents in PWR ice condenser plants, 8:23655 (J:US)
Correlation Functions
New look at correlations in atomic and molecular systems. I. Application of fermion Monte Carlo variational method, 8:24564 (J:US)
Corrosive Effects
Chemisorptive discharge of hydrogen ions: An elementary step in hydrogen corrosion, 8:23954 (R:DE)
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R:US)
Diffusion
Simple theory for maximum H inventory and release: a new transport parameter, 8:24798 (J:NL)
Small-polaron models for the hydrogen-concentration dependence of hydrogen diffusion in Nb, 8:23977 (J:US)
Studies of the diffusion of hydrogen in yttrium, 8:23990 (TJ:US)
Dissociation
Third body efficiencies for collision-induced dissociation of diatomics. Rate coefficients for $H+H_2 \rightarrow 3H$, 8:24550 (J:US)
Emission Spectra
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Gettering
Materials engineering of metal hydrides, 8:23216 (R:US)
Ion Spectroscopy
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion-Atom Collisions
Differential cross section for electron capture in fast ion-atom collisions, 8:24528 (RA:DE:In German)
Electron capture in ion-atom collisions at intermediate collision energies, 8:24530 (RA:DE:In German)
Molecular binding effects in electron capture in $Li^+ + H$ collisions, 8:24531 (RA:DE:In German)
Radiative charge transfer in collisions of He^{2+} ions and ground-state H atoms, 8:24553 (J:US)
Semiclassical trajectory effects on C^{6+}-H charge-exchange cross sections at low energy, 8:24556 (J:US)
Recovery
Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978, 8:23790 (R:US)
Recycling
Dependence of hydrogen recycling on molecular effects in tokamaks, 8:24872 (J:NL)
Experimental observation of a non-constant recombination coefficient - H/Pd(110); possible implications for hydrogen recycle in tokamaks, 8:24900 (J:NL)
Sorption
Diffusion of hydrogen in yttrium, 8:23553 (TJ:US)
Uses
Synopsis of results of the first programme on the production and utilization of hydrogen within the energy R+D programme of the Commission of the European Communities (1975-1979), 8:23212 (B:XE)

HYDROGEN 2
See DEUTERIUM

HYDROGEN 3
See TRITIUM

HYDROGEN CHLORIDES
See HYDROCHLORIC ACID

HYDROGEN DEUTERIDE
Atom-Molecule Collisions
Applications of classical trajectory techniques to reactive scattering, 8:24566 (J:US)

HYDROGEN FUEL CELLS
Anodes
20 kW-fuel cell units by compact assembly. Pt. 4, 8:23787 (R:DE:In German)
Cathodes
20 kW-fuel cell units by compact assembly. Pt. 4, 8:23787 (R:DE:In German)
Cost
20 kW-fuel cell units of compact assembly. Pt. 5, 8:23788 (R:DE:In German)
Design
20 kW fuel cell units of compact design. Pt. 1, 2, 8:23785 (R:DE:In German)
Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978, 8:23790 (R:US)
Feasibility Studies
Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978, 8:23790 (R:US)
Manufacturing
20 kW fuel cell units of compact design. Pt. 1, 2, 8:23785 (R:DE:In German)
20 kW fuel cell units of compact assembly. Pt. 3, 8:23786 (R:DE:In German)

20 kW-fuel cell units of compact assembly. Pt. 5, 8:23788 (R:DE:In German)
Performance Testing
20 kW fuel cell units of compact design. Pt. 1, 2, 8:23785 (R:DE:In German)
HYDROGEN HYDROXIDES
See WATER
HYDROGEN IONS 1 PLUS
For H_1^+ ions.
Ion-Atom Collisions
Differential cross section for electron capture in fast ion-atom collisions, 8:24528 (RA:DE:In German)
Electron capture in ion-atom collisions at intermediate collision energies, 8:24530 (RA:DE:In German)
Observation of the recoil effect on the K-shell excitation probabilities in ion-atom collisions, 8:24543 (RA:DE:In German)
Second Born calculation for electron capture, 8:24529 (RA:DE:In German, English)
Ion-Ion Collisions
Electron capture in ion-atom collisions at intermediate collision energies, 8:24530 (RA:DE:In German)
HYDROGEN IONS 2 PLUS
For H_2^+ ions.
Emission Spectra
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion Spectroscopy
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion-Molecule Collisions
Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982, 8:24522 (R:US)
Photon-Ion Collisions
UV-laser photofragmentation of a 2-MeV H_2^+ beam, 8:24515 (R:US)
HYDROGEN IONS 3 PLUS
For H_3^+ ions.
Emission Spectra
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
Ion Spectroscopy
Optical observations of molecular dissociation in thin foils, 8:24514 (R:US)
HYDROGEN ISOTOPES
See also DEUTERIUM
TRITIUM
Isotopic Exchange
Extended local mixing model for hydrogen retention and isotope exchange, 8:24797 (J:NL)
HYDROGEN NITRATES
See NITRIC ACID
HYDROGEN PRODUCTION
Biosynthesis
Photosynthetic hydrogen evolution by chloroplasts and algae and on a chloroplast battery, 8:23209 (R:US)
Electrolysis
An operating high temperature (1000°C) electrolysis demonstration unit, 8:23213 (J:US)
Development and parametric testing of alkaline water electrolysis cells for hydrogen production based on inorganic-membrane-electroylet technology. Final report, 8:23206 (R:US)
Electrolyzer module which uses bipolar electrodes with very high catalytic activity. Final report, 8:23204 (R:XE:FR)
High temperature water vapor electrolysis (HOT ELLY), 8:23203 (R:DE:In German)
Production of hydrogen by electrolysis of water under at medium temperature. Final report, 8:23205 (R:XE)
Synopsis of results of the first programme on the production and utilization of hydrogen within the energy R+D programme of the Commission of the European Communities (1975-1979), 8:23212 (B:XE)
Photochemical Reactions
Photocatalytic production of hydrogen from water by a p- and n-type polycrystalline iron oxide assembly, 8:23211 (J:US)
Photocatalytic production of hydrogen from water, using sunlight. Final report, 8:23207 (R:US)
Photochemical dissociation of water adsorbed in artificial membranes made from phyllosilicates. Final report, 8:23208 (R:US)
Photoelectrolysis
Conversion and chemical storage of solar energy in a photoelectrochemical cell. Final report, 8:23275 (R:US)
Steam Reformer Processes
20 kW-fuel cell units of compact assembly. Pt. 5, 8:23788 (R:DE:In German)
Thermochemical Processes
Synopsis of results of the first programme on the production and utilization of hydrogen within the energy R+D programme of the Commission of the European Communities (1975-1979), 8:23212 (B:XE)
HYDROGEN STORAGE
Synopsis of results of the first programme on the production and utilization of hydrogen within the energy R+D programme of the Commission of the European Communities (1975-1979), 8:23212 (B:XE)
Hydrides
Getting metal-hydrides to do what you want them to, 8:23215 (R:US)
Hydrogen absorption and temperature programmed desorption (TPD) studies of iron- and chromium-substituted ZrV_2, 8:23214 (R:US)
Materials engineering of metal hydrides, 8:23216 (R:US)
HYDROGEN SULFATES
See SULFURIC ACID
HYDROGEN SULFIDES
Removal
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R:US)
HYDROGENATION
Catalysts
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Optimization
Optimization of combination of coal hydrogenation, Fischer-Tropsch synthesis and gasification for the production of motor fuels, 8:22914 (R:DE:In German)
HYDROLOGY
Meetings
Proceedings of the workshop on nuclear techniques in hydrology (Lead abstract), 8:24483 (R:IN)
HYDROXYBENZENE
See PHENOL
HYDROXYTOLUENES
See CRESOLS
HYPERFRAGMENTS
See HYPERNUCLEI
HYPERNUCLEI
Binding Energy
Supernuclei, supernuclear matter & SU(4) symmetry, 8:24616 (RA:US)
Energy Levels
Theoretical nuclear reaction and structure studies using kaons and photons. Progress report, 1 February 1982-31 January 1983, 8:24641 (R:US)
OBE Model
Study of the T = 3/2 ΣN interaction, 8:24617 (RA:US)
Particle Decay
Λ and Σ hypernuclear physics, 8:24594 (RA:US)
Particle Production
Λ and Σ hypernuclear physics, 8:24594 (RA:US)
Preliminary report on an experiment to observe Σ hypernuclei in the 1p shell nuclei, 8:24595 (RA:US)

I-BEAM TYPE REACTORS
Beam Transport
Transport of light ion beams in plasma channels, 8:25135 (J:US)
First Wall
Gas dynamics and heat transfer phenomena in liquid metal ICF reactor first surfaces, 8:25138 (J:US)
Low density cavity gas fireball dynamics in the light ion beam target development facility, 8:24920 (J:US)
Heavy Ion Accelerators
Development of the rf linear accelerator test bed for heavy ion fusion, 8:25139 (J:US)
Development of the rf linear accelerator test bed for heavy-ion fusion, 8:24822 (R:US)
Linear Accelerators
Development of the rf linear accelerator test bed for heavy ion fusion, 8:25139 (J:US)
Development of the rf linear accelerator test bed for heavy-ion fusion, 8:24822 (R:US)
Pressure Vessels
Mechanical response of cavity tube banks in heavy ion beam fusion reactors, 8:25204 (J:US)
ICES
Computerized Simulation
TDIST2; community energy consumption analysis (IBM370,303x; FORTRAN IV, IBM FORTRAN G compiler), 8:23872 (R:US)
ICR HEATING
Control Systems
EBT-P plasma heating system instrumentation and control design, 8:25078 (J:US)
Electronic Equipment
Design of a 9 inch stub tuner for PLT icrh operation, 8:25096 (J:US)
Microwave Amplifiers
Conception, implementation and performance of the high power, high frequency amplifier for icrh at Fontenay-aux-Roses, France, 8:24925 (J:US)
Power Supplies
1.2 megawatt, 800 MHz rf generator for lower hybrid resonance heating, 8:25097 (J:US)
IDAHO NATIONAL ENGINEERING LABORATORY
Prior to 1976 known as NRTS and older material is so indexed.
Hot Cells
TMI-2 core-examination program: INEL facilities readiness study, 8:23607 (R:US)
Remote Handling Equipment
TMI-2 core-examination program: INEL facilities readiness study, 8:23607 (R:US)
IEA
See INTERNATIONAL ENERGY AGENCY
IGT WASTE PROCESS
See BIOGAS PROCESS
ILLINOIS
Black Shales
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R:US)
Natural Gas Deposits
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R:US)
ILLUMINATION SYSTEMS
See LIGHTING SYSTEMS
IMAGE PROCESSING
Data Transmission
High-speed maximum-entropy encoder for images, 8:25276 (R:US)
IMAGES
Noise
Radiographic screen-film noise power spectrum: calibration and intercomparison, 8:24210 (J:US)
IMMUNE SERA
See IMMUNE SERUMS
IMMUNE SERUMS
Antigen-Antibody Reactions
Immunological detection of two types of cyclobutane pyrimidine dimers in DNA, 8:24392 (J:US)
IMPERMEABLE DRY ROCK
See HOT-DRY-ROCK SYSTEMS
IMPURITIES
Unwanted constituents, not for TRACE AMOUNTS, INTERFERING ELEMENTS, or metal and nonmetal additions.
Control Systems
Analysis and design of a pumped-limiter impurity-control system for EBTR, 8:25171 (J:US)
Spectroscopy
Sputter-induced erosion of alkali metal surfaces - AES, XPS and SIMS studies, 8:24759 (R:US)
INCIDENTS
See ACCIDENTS
INCINERATION
See COMBUSTION
INCINERATORS
Design
Los Alamos Controlled Air Incinerator for radioactive waste. Volume I. Rationale, process, equipment, performance, and recommendations, 8:23147 (R:US)
Fly Ash
Inorganic compound identificatioon of fly ash emissions from municipal incinerators. Final report, 8:24051 (R:US)
Heat Recovery
Reliability engineering analysis - small-scale heat recovery incinerator installations (NS Mayport and NAS, Jacksonville). Final report, 8:23845 (R:US)
Operation
Los Alamos Controlled Air Incinerator for radioactive waste. Volume I. Rationale, process, equipment, performance, and recommendations, 8:23147 (R:US)
Radiation Monitoring
On-line, real-time measurements of decontamination factors for a low-level waste incinerator, 8:23179 (J:NL)
INCLUSION COMPLEXES
See CLATHRATES
INCOLOY 800
Corrosion
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
Failures
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
INCOMPRESSIBLE FLOW
Computer Codes
EVITS; steady state two-dimensional fluid flow (IBM360,370; FORTRAN IV), 8:24568 (R:US)
INCONEL 600
Intergranular Corrosion
Examination of Tube Samples 21-46 and 28-45 from the Ginna Nuclear Plant for intergranular attack, 8:23500 (R:US)
Intergranular attack in Inconel 600 nuclear steam generator tubes, 8:23923 (RA:US)
Microanalysis
Intergranular attack in Inconel 600 nuclear steam generator tubes, 8:23923 (RA:US)
INCONEL 625
Coatings
Thermal fatigue testing of low-Z coatings on molybdenum and Inconel 625, 8:24907 (J:NL)
Corrosion
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
INCONEL ALLOYS
See also INCONEL 600

INCONEL 625
Corrosion
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
Embrittlement
Metallographic and fractographic aspects of liquid-metal embrittlement (Al-Zn-Mg (6.3% Zn 2.9% Mg); Ni 200 alloy (99.5% Ni); Inconel 601; D6AC steel), 8:23915 (RA:US)
Failures
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
Fractures
Metallographic and fractographic aspects of liquid-metal embrittlement (Al-Zn-Mg (6.3% Zn 2.9% Mg); Ni 200 alloy (99.5% Ni); Inconel 601; D6AC steel), 8:23915 (RA:US)

IN-CORE FUEL MANAGEMENT
See FUEL MANAGEMENT

INDIA
Biomass Conversion Plants
Family and community biogas plants in rural India and China, 8:23222 (R:US)

INDIAN POINT-3 REACTOR
Engineered Safety Systems
Preliminary investigation of interconnected systems interactions for the safety injection system of Indian Point-3, 8:23638 (R:US)

INDIAN RESERVATIONS
Natural Gas Deposits
Report to the Fort Belknap Community Council on the work undertaken during the summer, 1979, 8:23014 (R:US)
Petroleum Deposits
Report to the Fort Belknap Community Council on the work undertaken during the summer, 1979, 8:23014 (R:US)

INDIANA
Black Shales
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Natural Gas Deposits
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Seismicity
Geophysical investigations of the Western Ohio-Indiana region. Annual report, October 1981-September 1982, 8:24492 (R:US)

INDIUM 120
Energy Levels
Los Alamos: nuclear monopole, 8:24680 (J:XC)

INDUCED POLARIZATION LOGGING
IP2D.REV1; resistivity & induced-polarization (UNIVAC1108,1100; FORTRAN V (99%) and Assembler (1%)), 8:23367 (R:US)

INDUCTORS
See SOLENOIDS

INDUSTRIAL PLANTS
See also CHEMICAL PLANTS
COAL GASIFICATION PLANTS
COAL LIQUEFACTION PLANTS
COAL PREPARATION PLANTS
DESALINATION PLANTS
FEED MATERIALS PLANTS
METHANOL PLANTS
OIL SHALE PROCESSING PLANTS
PETROLEUM REFINERIES
WASTE PROCESSING PLANTS
Boiler Fuels
Industrial fuel applications. Furnaces and dryers, 8:23000 (R:NL:In Dutch)
Boilers
Advanced environmental control technology , 8:22952 (R:US)
Converting small industrial boilers to burn wood fuels. Forest Service research paper (final), 8:24153 (R:US)
Fuel Consumption
Industrial fuel applications. Furnaces and dryers, 8:23000 (R:NL:In Dutch)
Gas Turbines
Critical Research and Advanced Technology (CRT) Support Project. Summary report, 8:23415 (R:US)
Power Demand
Typical electric bills. January 1, 1982, 8:23730 (R:US)
Utility Spot-Pricing Study: Wisconsin, 8:23748 (R:US)

INDUSTRIAL SECTOR
See INDUSTRY

INDUSTRIAL WASTES
Combustion
Fluidized bed retrofit study of CE-VUX type boiler at the Jamestown Board of Public Utilities, Carlson Station, Jamestown, New York, 8:23424 (R:US)
Waste Product Utilization
Study, design, and development program for a phosphoric acid fuel cell and waste hydrogen utilization. Final technical report, June 1, 1976-May 31,1978, 8:23790 (R:US)

INDUSTRIALIZED COUNTRIES
See DEVELOPED COUNTRIES

INDUSTRY
See also AGRICULTURE
COAL INDUSTRY
ELECTRIC POWER INDUSTRY
GLASS INDUSTRY
METAL INDUSTRY
NATURAL GAS INDUSTRY
NUCLEAR INDUSTRY
OIL SHALE INDUSTRY
PETROLEUM INDUSTRY
SYNTHETIC FUELS INDUSTRY
TEXTILE INDUSTRY
Economic Development
Energy company development patterns in the postembargo era. An overview of financial performance, 1974-1980. Volume 1: analysis of trends (Glossary), 8:23699 (R:US)
Energy Consumption
1981 commercial and industrial survey: customers of municipal and cooperative distributors of TVA power, 8:23752 (R:US)

INELASTIC SCATTERING
Wave Functions
L2RMAT; coupled channel inelastic scattering (CDC7600,CYBER175; FORTRAN IV), 8:24747 (R:US)

INERTIAL CONFINEMENT
A dynamic plasma confinement by inertial forces.
Electron beam transport through the atmosphere in reduced-density, current-carrying channels, 8:25153 (J:US)
Targets
High target gain to ICF reactor - a problem of repetition, 8:25137 (J:US)
Preliminary conceptual design and engineering aspects of a light ion fusion target development facility (TDF), 8:25136 (J:US)

INFANTS
Sensitivity
Smoking, infant birthweight and lead burden in developing children, 8:24459 (J:US)

INFORMATION DECLASSIFICATION
See DECLASSIFICATION

INFORMATION DISSEMINATION
Administrative Procedures
Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study, 8:23727 (R:US)
Global Aspects
Transborder flow of information. Summary paper, 8:25285 (R:US)
Legal Aspects
Dissemination of technical information from the oil-shale program, 8:23079 (R:US)
Management
Information for technology innovation. Summary paper, 8:25234 (R:US)
Technology Transfer
Information for technology innovation. Summary paper, 8:25234 (R:US)

INFORMATION RETRIEVAL
Data Base Management
Visual-response indicator for bar-code-reader input. Final report, 8:25265 (R:US)

INHALATION EXPOSURE CHAMBERS
See EXPOSURE CHAMBERS
INHIBITORS (CORROSION)
See CORROSION INHIBITORS
INHOMOGENEOUS PLASMA
Alfven Waves
Kinetic theory of Alfven waves, 8:24762 (R:US)
Correlation Functions
Integral representation for geometric optics solutions, 8:24781 (J:US)
Kinetic Equations
Kinetic theory of Alfven waves, 8:24762 (R:US)
Radiations
Integral representation for geometric optics solutions, 8:24781 (J:US)
INPUT-OUTPUT ANALYSIS
Disaggregation, input-output analysis, and energy impacts, 8:23685 (R:US)
IN-SERVICE INSPECTION
Nondestructive evaluation program: progress in 1982 (PWR; BWR), 8:23464 (R:US)
IN-SITU COMBUSTION
Field Tests
In-situ combustion project at Bartlett, Kansas. Final report, 8:23016 (R:US)
IN-SITU GASIFICATION
Economics
Underground coal gasification product quality parameters, 8:22940 (J:US)
Environmental Impacts
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R:IT)
Field Tests
Depositional environments, subsurface stratigraphy, and post-burn characterization of the Paleocene-Eocene Hanna Formation at the Hanna, Wyoming underground coal-gasification site: Hanna II Phase 1 experiment (Hanna II; post mortem examination), 8:22923 (R:US)
Underground coal gasification product quality parameters, 8:22940 (J:US)
IN-SITU RETORTING
Air Pollution
Atmospheric resource research, 8:23090 (RA:US)
Environmental Impacts
Ecological resource research, 8:23092 (RA:US)
Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record, 8:23089 (R:US)
Land Reclamation
Ecological resource research, 8:23092 (RA:US)
Permits
Environmental permits, 8:23095 (RA:US)
Research Programs
Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil-shale-retorting process. Research record, 8:23089 (R:US)
Risk Assessment
Risk assessment and mitigation, 8:23094 (RA:US)
Socio-Economic Factors
Cultural-economic resource research, 8:23093 (RA:US)
Water Pollution
Hydrologic resource research, 8:23091 (RA:US)
INSOLATION
Calculation Methods
Estimates of the daily solar radiation on orientated and inclined receiver surfaces. Final report, 8:23247 (R:US:FR)
Climates
Environmental data for sites in the National Solar Data Network, 8:23249 (R:US)
Data Compilation
Environmental data for sites in the National Solar Data Network, 8:23251 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23248 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23250 (R:US)
INSTRUMENTS (MEASURING)
See MEASURING INSTRUMENTS
INSULATING LIMITERS
See LIMITERS
INSULATING OILS
Chemical Properties
Reclamation of transformer oils containing PCBs by the Sunohio PCBX Process. Final report, 8:23038 (R:US)
Electrical Properties
Reclamation of transformer oils containing PCBs by the Sunohio PCBX Process. Final report, 8:23038 (R:US)
Pumping
Electrohydrodynamic pumping in cable pipes. Final report, 8:23435 (R:US)
Recycling
Reclamation of transformer oils containing PCBs by the Sunohio PCBX Process. Final report, 8:23038 (R:US)
INSULATION (ELECTRICAL)
See ELECTRICAL INSULATION
INSULATION (THERMAL)
See THERMAL INSULATION
INSULATORS (ELECTRICAL)
See ELECTRICAL INSULATORS
INTAKE STRUCTURES
Performance Testing
Advanced intake technology for cooling-water intakes: current status and future direction, 8:23409 (R:US)
Technology Assessment
Advanced intake technology for cooling-water intakes: current status and future direction, 8:23409 (R:US)
INTEGRALS
ELLIPTIC; elliptic integrals by duplication (NAS AS/6;IBM370 (designed to be machine-independent); FORTRAN IV), 8:25262 (R:US)
INTEGRATED COMMUNITY ENERGY SYSTEMS
See ICES
INTEGRATED UTILITY SYSTEMS
See TOTAL ENERGY SYSTEMS
INTERCALATES
See CLATHRATES
INTERCONNECTED POWER SYSTEMS
Control
Hierarchical stability and alert state steering control of interconnected power systems, 8:23441 (J:US)
Load Management
Assessment of load-frequency-control impacts caused by small wind turbines, 8:23393 (R:US)
Oscillations
Phase II: frequency domain analysis of low-frequency oscillations in large electric power systems. Volume 1. Basic concepts, mathematical models, and computing methods. Final report, 8:23434 (R:US)
Reliability
US-Canadian electricity trade, 8:23740 (R:US)
Stability
Hierarchical stability and alert state steering control of interconnected power systems, 8:23441 (J:US)
Phase II: frequency domain analysis of low-frequency oscillations in large electric power systems. Volume 1. Basic concepts, mathematical models, and computing methods. Final report, 8:23434 (R:US)
Systems Analysis
Phase II: frequency domain analysis of low-frequency oscillations in large electric power systems. Volume 1. Basic concepts, mathematical models, and computing methods. Final report, 8:23434 (R:US)
Wind Turbines
Assessment of load-frequency-control impacts caused by small wind turbines, 8:23393 (R:US)
Assessment of distributed wind-power systems, 8:23392 (R:US)
Assessment of distributed wind-power systems. Final report, 8:23391 (R:US)
INTERFEROMETERS
Performance
Velocity perturbation of a flyer approaching a rigid impermeable barrier and the transmitted pressure pulse, 8:24214 (R:US)

INTERLABORATORY COMPARISONS
Research Programs
In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982 (Lead abstract), 8:24197 (R:US)
INTERNAL COMBUSTION ENGINES
See also DIESEL ENGINES
Research Programs
Sandia technology, 8:23882 (R:US)
INTERNAL IRRADIATION
Risk Assessment
Risk estimates for bone, 8:24363 (R:US)
INTERNATIONAL ENERGY AGENCY
Energy Policy
International Energy Agency and its growing task, 8:23714 (R:DE:In German)
Energy Supplies
International Energy Agency and its growing task, 8:23714 (R:DE:In German)
Market
International Energy Agency and its growing task, 8:23714 (R:DE:In German)
Research Programs
Results of the IEA pyrolysis project at Bergbau-Forschung, 8:22904 (RA:CA)
INTERNATIONAL TOKAMAK REACTOR
See INTOR TOKAMAK
INTOR TOKAMAK
International Tokamak Reactor.
Breeding Blankets
Conceptual design of tritium breeding blanket for INTOR, 8:24956 (J:US)
Neutronic analysis of graphite-moderated solid breeder design for INTOR, 8:24824 (R:US)
Neutronics analysis of graphite-moderated solid breeder blanket designs for INTOR, 8:24957 (J:US)
Design
International tokamak reactor conceptual design overview, 8:25037 (J:US)
INTOR physics, 8:25038 (J:US)
Overview of INTOR nuclear systems, 8:24955 (J:US)
Divertors
Neutral gas blanket effects in a gaseous divertor, 8:24858 (J:NL)
First Wall
Conceptual design of the INTOR first wall system, 8:25173 (J:US)
Conceptual design of the INTOR first-wall system, 8:24823 (R:US)
Global estimates of impurity levels and wall erosion in INTOR, 8:24869 (J:NL)
INTOR first wall erosion during plasma disruption, 8:24964 (J:US)
Impurities
Global estimates of impurity levels and wall erosion in INTOR, 8:24869 (J:NL)
Magnet Coils
Magnet design for INTOR, 8:25039 (J:US)
Materials Testing
Important material considerations in INTOR, 8:24820 (R:US)
Poloidal Divertors
U.S. INTOR divertor design, 8:25174 (J:US)
Power Supplies
INTOR power handling and conversion, 8:25071 (J:US)
Radiation Protection
INTOR radiation shielding for personnel access, 8:25175 (J:US)
Shielding
INTOR radiation shielding for personnel access, 8:25175 (J:US)
Specifications
Key features of INTOR nuclear systems, 8:24819 (R:US)
Superconducting Magnets
Superconducting poloidal field coil studies for INTOR, 8:25046 (J:US)
IODIDES
See also COPPER IODIDES
SILVER IODIDES
SODIUM IODIDES
Isotachophoresis
Isotachophoresis, 8:24050 (R:US)
IODINE
Corrosive Effects
Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours, 8:23920 (RA:US)
Thermodynamic assessment of in-reactor iodine SCC of zircaloy, 8:23982 (J:NL)
IODINE 129
Adsorption
Iodine-fixation studies at the Pacific Northwest Laboratory, 8:23165 (R:US)
IODINE 131
Radiation Monitoring
Mechanical-reliability evaluation of a proposed emergency-response radioiodine air sampler, 8:24249 (R:US)
IODINE IODIDES
See IODINE
IODODEOXYURIDINE
Radiosensitivity Effects
Environmental insults to DNA, 8:24413 (RA:US)
ION ACOUSTIC WAVES
Non-dispersive ion waves
Wave Propagation
Nonlinear electrostatic waves: oblique propagation, 8:24800 (J:GB)
ION BEAM TYPE REACTORS
See I-BEAM TYPE REACTORS
ION BEAMS
Beam Transport
Transport of light ion beams in plasma channels, 8:25135 (J:US)
Focusing
Plasma wake of mesosonic conducting bodies. Pt. 1. An experimental parametric study of ion focusing by the plasma sheath, 8:24916 (J:GB)
Plasma Sheath
Plasma wake of mesosonic conducting bodies. Pt. 1. An experimental parametric study of ion focusing by the plasma sheath, 8:24916 (J:GB)
ION BLOCKING
See ION CHANNELING
ION CHANNELING
Coherent Radiation
Coherent absorption and emission processes of energetic particles penetrating crystals, 8:24731 (BA:US)
Photon Emission
Coherent absorption and emission processes of energetic particles penetrating crystals, 8:24731 (BA:US)
ION COLLISIONS
See also ELECTRON-ION COLLISIONS
ION-ATOM COLLISIONS
ION-ION COLLISIONS
PHOTON-ION COLLISIONS
Electron Capture
Charge state determination of fast ions in solids using radiative electron capture (REC), 8:24538 (RA:DE:In German)
Electron capture into Rydberg states of fast ion beams following gas and foil excitation, 8:24542 (RA:DE:In German, English)
Laser Spectroscopy
Static-mode laser-fluorescence spectroscopy: a new technique for studying excitation mechanisms in particle-surface collisions, 8:24521 (R:US)
ION CYCLOTRON-RESONANCE HEATING
See ICR HEATING
ION DRIFT
Magnetic Field Ripples
Effects of toroidal field ripple on suprathermal ions in tokamak plasmas, 8:24803 (J:GB)
Thermal Equilibrium
Effects of toroidal field ripple on suprathermal ions in tokamak plasmas, 8:24803 (J:GB)

ION IMPLANTATION
Radiation Effects
COREL;RASE4;DAMG2; ion implantation deposition (CDC6600,7600; FORTRAN IV. The programs, originally written for the FUN compiler, were translated by the NESC for compilation under FTN.), 8:24718 (R:US)
ION SOURCES
Design
Prototype ion source for JT-60 NBI, 8:25109 (J:US)
Fabrication
Development, fabrication and tests of the periplasmatron ion sources for ASDEX, 8:25088 (J:US)
Technology Assessment
Status and trends in the development and application of positive-ion-based neutral injectors, 8:25112 (J:US)
Test Facilities
Large source test stand for H/sup -/(D/sup -/) ion source, 8:24928 (J:US)
Testing
Development, fabrication and tests of the periplasmatron ion sources for ASDEX, 8:25088 (J:US)
ION SPECTROSCOPY
Magnetic Spectrometers
Spectroscopy of neutron-rich nuclei via particle-γ-coincidences with a magnetic spectrograph, 8:24202 (RA:DE:In German)
ION-ATOM COLLISIONS
Coulomb Ionization
Analytic form factors for Coulomb ionization, 8:24533 (RA:DE:In German)
Inelastic Scattering
Calculation of KL-vacancy sharing in asymmetric ion-atom collisions, 8:24541 (RA:DE:In German)
IONIC REACTIONS
See IONS
ION-ION COLLISIONS
Deformation
Molecular dipole deformation as a collective variable in slow atomic collisions, 8:24532 (RA:DE:In German)
IONIZATION CALORIMETERS
See SHOWER COUNTERS
IONIZATION GAGES
Design
Very small ionization pressure gauge, 8:24144 (R:US)
IONOSPHERE
Computerized Simulation
Computer model of chemistry and dynamics of the mesosphere, thermosphere, and ionosphere, 8:24508 (R:US)
IONS
Ions in solutions are indexed as compounds; ions in gases by the precoordinated descriptor consisting of the element name and the term ions; ions in beams by assigning either the specific name if available, e.g. ARGON 40 BEAMS
See also ARGON IONS
BROMINE IONS
CALCIUM IONS
CARBON IONS
CERIUM IONS
CHLORINE IONS
COPPER IONS
DEUTERIUM IONS
GERMANIUM IONS
HELIUM IONS
IRON IONS
KRYPTON IONS
LITHIUM IONS
MOLECULAR IONS
NEODYMIUM IONS
NEON IONS
NITROGEN IONS
PALLADIUM IONS
POTASSIUM IONS
SCANDIUM IONS
SELENIUM IONS
SILICON IONS
SILVER IONS
SULFUR IONS
VANADIUM IONS
XENON IONS
Depth Dose Distributions
COREL;RASE4;DAMG2; ion implantation deposition (CDC6600,7600; FORTRAN IV. The programs, originally written for the FUN compiler, were translated by the NESC for compilation under FTN.), 8:24718 (R:US)
Range
COREL;RASE4;DAMG2; ion implantation deposition (CDC6600,7600; FORTRAN IV. The programs, originally written for the FUN compiler, were translated by the NESC for compilation under FTN.), 8:24718 (R:US)
IONS (MOLECULAR)
See MOLECULAR IONS
IPNS-I SYNCHROTRON
Intense Pulsed Neutron Source.
Neutron Diffractometers
Data acquisition system for the neutron scattering instruments at the intense pulsed neutron source, 8:24172 (R:US)
IPNS distributed-processing data-acquisition system, 8:24173 (R:US)
Targets
Evaluation of structural integrity of IPNS-I and ZING-P' targets, 8:24171 (R:US)
IRIDIUM
Agglomeration
Structure of bimetallic clusters. Extended x-ray absorption fine structure (EXAFS) studies of Ir—Rh clusters, 8:23972 (J:US)
IRON
Catalytic Effects
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Synthesis of liquids and pipeline gas by Fischer-Tropsch (Taconite + K; iron sheathed taconite; taconite + Cu + K), 8:23221 (R:US)
Corrosion Protection
Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces, 8:23901 (RA:US)
Environmental Exposure Pathway
Lead and iron status of breast and formula-fed infants, 8:24468 (J:US)
Metabolism
Lead and iron status of breast and formula-fed infants, 8:24468 (J:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
IRON 56 REACTIONS
Inclusive Interactions
Emission of light charged particles in the reaction ^{165}Ho + ^{56}Fe, 8:24685 (RA:DE:In German, English)
IRON 56 TARGET
Xenon 132 Reactions
No need for a new damping mechanism in the system ^{132}Xe + ^{56}Fe at energies below 7.12 MeV/ν, 8:24673 (RA:DE:In German, English)
IRON ALLOYS
See also HAYNES 188 ALLOY
INCONEL 600
INCONEL 625
IRON BASE ALLOYS
Corrosion Resistance
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Crystallization
Stem observation of crystallization in thin films of amorphous Fe/sub 40/Ni/sub 40/P/sub 14/B/sub 6/, 8:23984 (J:US)
Electrochemical Corrosion
Corrosion behavior of high density tungsten alloys, 8:23899 (RA:US)
Moessbauer Effect
Moessbauer spectrometry study of Fe-Ni-X alloys, 8:23970 (R:US)
Phase Studies
Stem observation of crystallization in thin films of amorphous Fe/sub 40/Ni/sub 40/P/sub 14/B/sub 6/, 8:23984 (J:US)
IRON BASE ALLOYS
See also CAST IRON
STEELS
Ductility
Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys (Metglas 2826, BNi-3, BNi-6, FeBSi, FeBCSi), 8:23916 (RA:US)

Embrittlement
Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys (Metglas 2826, BNi-3, BNi-6, FeBSi, FeBCSi), 8:23916 (RA:US)
Hydrogen Embrittlement
Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys (Metglas 2826, BNi-3, BNi-6, FeBSi, FeBCSi), 8:23916 (RA:US)
Tensile Properties
Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys (Metglas 2826, BNi-3, BNi-6, FeBSi, FeBCSi), 8:23916 (RA:US)

IRON HYDROXIDES
Reduction
In-situ studies of reduction reactions of weathering steel surface films by Raman spectroscopy, 8:23900 (RA:US)

IRON IONS
Electron-Ion Collisions
Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence, 8:24554 (J:US)

IRON OXIDES
Catalytic Effects
Photocatalytic production of hydrogen from water by a p- and n-type polycrystalline iron oxide assembly, 8:23211 (J:US)
Self-Diffusion
Diffusion mechanisms in transition-metal oxides, 8:23995 (R:US)
Sensible Heat Storage
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R:US)
Sorptive Properties
Hydrides of oxygen-stabilized intermetallic phases (Zr_3V_3O; Ti_4M_2O/sub x/ (M = Fe, Co, Ni)), 8:23998 (R:US)
Thermodynamic Properties
Evaluation of thermal-energy storage-materials for advanced compressed-air energy-storage systems, 8:23666 (R:US)

IRON-NICKEL BATTERIES
Research Programs
Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program, 8:23676 (R:US)

IRRADIATION DEVICES
Transport
Sewage Solids Irradiator Transportation System (SSITS) cask: preliminary design description, 8:24113 (R:US)

IRRADIATION RIGS
See IRRADIATION DEVICES

IRRIGATION
1981 Winter Meeting - American Society of Agricultural Engineers, 8:23868 (J:US)

ISOTACHOPHORESIS
Uses
Isotachophoresis, 8:24050 (R:US)

ISOTOPE ENRICHMENT
See ISOTOPE SEPARATION

ISOTOPE SEPARATION
For separation of isotopes of the same element only.
Sources of separated isotopes for nuclear targetry, 8:23200 (BA:US)
Palladium Alloys
Design study of fuel circulating system using Pd alloy membrane isotope separation method, 8:23199 (RA:JP)

ISOTOPIC SEPARATION
See ISOTOPE SEPARATION

ISX TOKAMAK
Gettering
Gettering in ISX-B, 8:24879 (J:NL)
Superconducting Magnets
Superconducting ohmic heating solenoid concept for ISX-C, 8:25014 (J:US)

ITALY
Earthquake Magnitude
Magnitude readings of the Lucano-Campano earthquakes of November 23, 1980 as recorded by accelerometers, 8:24487 (R:IT:IT)
Earthquakes
Magnitude readings of the Lucano-Campano earthquakes of November 23, 1980 as recorded by accelerometers, 8:24487 (R:IT:IT)
Geologic Models
Seismische studien zur bestimmung der krustenstruktur im bereich der geothermischen anomalie der toskana (seismic studies for defining the structure of the crust within the area of the geothermal anomaly of tuscany). Final report, 8:23374 (R:US)
Seismic Surveys
Seismische studien zur bestimmung der krustenstruktur im bereich der geothermischen anomalie der toskana (seismic studies for defining the structure of the crust within the area of the geothermal anomaly of tuscany). Final report, 8:23374 (R:US)
Seismicity
Observation of several large earthquakes with an eastern epicenter. The macroseismic region in Italy of the 1903 Greek earthquake, 8:24488 (R:IT:IT)

IUDR
See IODODEOXYURIDINE

IUS
See TOTAL ENERGY SYSTEMS

J

JAILS
See PUBLIC BUILDINGS

JAPAN INSTITUTE PLASMA PHYSICS STELLARATO
See JIPP STELLARATOR

JET REACTORS
Beam Neutralization
Conductance thermal accommodation and beaming from neutralizer gas-cells, 8:25087 (J:US)
Cryopumps
Cryopumps for JET - design of a large scale system of open configuration for high specific pumping speed, 8:25203 (J:US)
First Wall
Deuterium trapping in low-Z coatings, 8:24898 (J:NL)
High-Frequency Heating
Mechanical aspects of the design of a lower hybrid frequency grill launcher for the Joint European Torus (J.E.T.), 8:25094 (J:US)
Ion Temperature
Proposal for time-resolved ion temperature measurements by means of Rutherford scattering of the JET heating beams, 8:24773 (R:NL)
Joule Heating
JET ohmic heating circuit, 8:25061 (J:US)
Neutral Atom Beam Injection
Status of the JET neutral injection system, 8:25108 (J:US)
Neutral Beam Sources
Conductance thermal accommodation and beaming from neutralizer gas-cells, 8:25087 (J:US)
Engineering design and manufacturing of prototype neutral injector for JET, 8:25115 (J:US)
Status of the JET neutral injection system, 8:25108 (J:US)
Plasma Diagnostics
Proposal for time-resolved ion temperature measurements by means of Rutherford scattering of the JET heating beams, 8:24773 (R:NL)
Power Supplies
Design, fabrication and erection of flywheel-generator-convertors for the JET tokamak, 8:25060 (J:US)
JET ohmic heating circuit, 8:25061 (J:US)
Superconducting Magnets
Status of the magnet systems and highlight of the main assembly problems, 8:25032 (J:US)

JIPP STELLARATOR
Limiters
All TiC coated limiter experiment in the JIPP T-II tokamak, 8:24860 (J:NL)
JT-60 REACTORS
Coatings
Thermal shock testing of low-Z coatings for JT-60, 8:24906 (J:NL)
Computerized Control Systems
System design of ZENKEI, the central control system for JT-60, 8:25177 (J:US)
Control Systems
Design concept of real-time plasma control for JT-60, 8:25179 (J:US)
Data Processing
Data processing system for JT-60, 8:25198 (J:US)
First Wall
Development of low-Z surface coatings for JT-60 first wall, 8:24908 (J:NL)
Fatigue data of molybdenum, 8:25164 (J:US)
Ion Sources
Prototype ion source for JT-60 NBI, 8:25109 (J:US)
Magnet Coils
Fatigue design of the poloidal field coil for JT-60 tokamak machine, 8:25000 (J:US)
Load tests of a large coil, 8:25001 (J:US)
Nonlinear stress analysis of the poloidal field coil for JT-60 tokamak machine, 8:24999 (J:US)
Neutral Atom Beam Injection
Construction of prototype injector unit for JT-60, 8:25110 (J:US)
Neutral Beam Sources
Construction of prototype injector unit for JT-60, 8:25110 (J:US)
Vacuum Systems
Full-scale model of cooling and heating system for JT-60 vacuum vessel, 8:25212 (J:US)

K

K02
See KAONS NEUTRAL LONG-LIVED
KAON PLUS REACTIONS
Elastic Scattering
Uncertainty in the K^+-nucleus interaction below 1 GeV, 8:24618 (RA:US)
KAON-NUCLEON INTERACTIONS
Z*Resonances
πN, anti KN, and KN phenomenology, 8:24588 (RA:US)
KAONS
Muon Number
Muon number violating kaon decays, 8:24607 (RA:US)
Photoproduction
Theoretical nuclear reaction and structure studies using kaons and photons. Progress report, 1 February 1982-31 January 1983, 8:24641 (R:US)
Weak Hadronic Decay
Quark-tadpole transitions and the $\Delta I = (1/2)$ rule in K decays, 8:24627 (J:US)
Weak Particle Decay
Experiments in the kaon system, 8:24580 (RA:US)
Muon number violating kaon decays, 8:24607 (RA:US)
KAONS 2
See KAONS NEUTRAL LONG-LIVED
KAONS NEUTRAL LONG-LIVED
Radiative Decay
Quark-diagram contribution to K/sub L/ $\rightarrow \gamma\gamma$, 8:24582 (RA:US)
KAPITZA RESISTANCE
Kapitza thermal boundary resistance between two solids, 8:24746 (BA:US)
KARLSRUHE NUCLEAR RESEARCH CENTER
See KERNFORSCHUNGSZENTRUM KARLSRUHE
KENTUCKY
Black Shales
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Natural Gas Deposits
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Radioactive Waste Management
Comprehensive low-level waste management plan for the state of Kentucky. Fifth quarterly report for the period ending December 31, 1982, 8:23121 (R:US)
KERNELS (FUEL)
See FUEL PARTICLES
KERNFORSCHUNGSZENTRUM KARLSRUHE
Reactor Safety
Nuclear safety project, 8:23618 (R:DE:In German)
KEROSENE
Atomization
Antimisting kerosene atomization and flammability. Interim report, 8:23046 (R:US)
Flammability
Antimisting kerosene atomization and flammability. Interim report, 8:23046 (R:US)
Fuel Additives
Frictional characteristics and heat transfer of antimisting fuels in tubes. Final report Aug 80-Sep 81, 8:23044 (R:US)
Shear Properties
Frictional characteristics and heat transfer of antimisting fuels in tubes. Final report Aug 80-Sep 81, 8:23044 (R:US)
KETONES
Oxidation
Synthetic and catalytic studies directed toward homogeneously catalyzed selective oxidation. Final report, 8:24059 (R:US)
KICKSORTERS
See PULSE ANALYZERS
KILNS
Heat Recovery
Heat recovery by organic Rankine cycle in ceramics firing ovens. Final report, 8:23865 (R:US)
KLYSTRONS
Beam Dynamics
SLACKLY; 1-dimensional multicavity klystron tube analysis (IBM360,370; FORTRAN IV), 8:24166 (R:US)
KNOCK-ON ELECTRONS
See ELECTRONS
KOREA (SOUTH)
See REPUBLIC OF KOREA
KORTEWEG-DE VRIES EQUATION
Baecklund Transformation
Painleve property for partial differential equations, 8:25280 (J:US)
Singularity
Painleve property for partial differential equations, 8:25280 (J:US)
KRYPTON
Ion-Atom Collisions
Charge distributions of recoil ions, 8:24537 (RA:DE:In German)
L-K vacancy sharing in Ar + Kr collisions, 8:24534 (RA:DE:In German)
Target thickness and density effects for inner shell excitation in near symmetric collision-systems, 8:24544 (RA:DE:In German)
Photoionization
Resonance ionization spectroscopy schemes for Ar, Kr and Xe, 8:24559 (J:NL)
KRYPTON 79
Nuclear Quadrupole Resonance
Quadrupole interaction of ^{79}Kr in zinc at high temperatures, 8:23956 (RA:DE:In German)

KRYPTON 84 REACTIONS
Inelastic Scattering
Multiple Coulomb excitation of very heavy systems within the classical S-matrix theory, 8:24709 (RA:DE:In German, English)
KRYPTON 85
Environmental Transport
Statistical performance of several mesoscale atmospheric dispersion models, 8:24250 (J:US)
Inventories
Byproduct inventories, 8:23171 (R:US)
Recovery
Potential for beneficial use of krypton-85, 8:23170 (R:US)
Technology for recovery of byproducts, 8:23173 (R:US)
Uses
Potential for beneficial use of krypton-85, 8:23170 (R:US)
KRYPTON 86 REACTIONS
Deep Inelastic Heavy Ion Reactions
Bombarding energy dependence of angular momentum transfer in deep inelastic collisions, 8:24690 (J:NL)
Dynamical coupling of relative motion, deformations and charge transfer within a Fokker-Planck equation for deep inleastic collisions, 8:24682 (RA:DE:In German, English)
Role of deformation and shell effects in deep inelastic collisions of $^{86}Kr + {}^{88}Sr, {}^{90}Zr, {}^{92}Mo$ at energies close to the Coulomb barrier, 8:24667 (RA:DE:In German, English)
Heavy Ion Reactions
Global increase of near- and below-barrier fusion for heavier systems, 8:24664 (RA:DE:In German, English)
KRYPTON IONS
Electron-Ion Collisions
Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence, 8:24554 (J:US)
Ion-Atom Collisions
Charge distributions of recoil ions, 8:24537 (RA:DE:In German)
KUHFR REACTOR
Fuel Cycle
US RERTR program, its fuel-development activities, and application in the KUHFR, 8:23575 (R:US)
Reactor Cores
US RERTR program, its fuel-development activities, and application in the KUHFR, 8:23575 (R:US)
Reactor Kinetics
US RERTR program, its fuel-development activities, and application in the KUHFR, 8:23575 (R:US)
KUPFFER CELLS
See RETICULOENDOTHELIAL SYSTEM
KYOTO UNIVERSITY HIGH FLUX REACTOR
See KUHFR REACTOR

L

LAKES
See also DEAD SEA
Acidification
Distribution and characteristics of surficial geologic materials in the ILWAS watershed, 8:24282 (RA:US)
Integrated lake-watershed acidification study: proceedings of the ILWAS annual review conference (Lead abstract), 8:24280 (R:US)
Lake acidification during spring snowmelt: processes and causes, 8:24285 (RA:US)
Lysimeter and soil chemistry studies, 8:24501 (RA:US)
Mineralogy of the ILWAS lake-watering, 8:24499 (RA:US)
Overview of the integrated lake-water acidification study (ILWAS), 8:24281 (RA:US)
Temporal trends in the pH of Woods, Sagamore, and Panther Lakes as determined by an analysis of diatom population, 8:24287 (RA:US)
Geochemical Surveys
Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23098 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R:US)
Water Chemistry
Lake acidification during spring snowmelt: processes and causes, 8:24285 (RA:US)
LAMPF II SYNCHROTRON
Meetings
Proceedings of the workshop on LAMPF II synchrotron, 8:24183 (R:US)
LAMPF LINAC
Remote Handling Equipment
History of remote handling at LAMPF, 8:24192 (J:US)
Research Programs
Speculative ten-year plan for nuclear physics at LAMPF, 8:24596 (RA:US)
LAND FILLS
See SANITARY LANDFILLS
LAND POLLUTION
Environmental Transport
OPTRM; hydrologic transport with optimization (IBM360,370; FORTRAN IV (96%) AND BAL (4%)), 8:24276 (R:US)
LANDFILLS
See SANITARY LANDFILLS
LANDFORMS
See GEOMORPHOLOGY
LANGMUIR OSCILLATIONS
See PLASMA WAVES
LANTHANIDES
See RARE EARTHS
LANTHANUM ALLOYS
Fermi Level
Fermi-surface properties of $CeSn_3$ and related compounds ($LaSn_3$), 8:23947 (R:US)
LANTHANUM SULFIDES
Superconductivity
Hydrostatic pressure effects on the superconductivity of La/sub 1.2-x/Eu/sub x/MO_6S_8 pseudoternary compounds, 8:24041 (J:US)
Transition Temperature
Hydrostatic pressure effects on the superconductivity of La/sub 1.2-x/Eu/sub x/MO_6S_8 pseudoternary compounds, 8:24041 (J:US)
LARAMIE ENERGY TECHNOLOGY CENTER
Contract Management
Dissemination of technical information from the oil-shale program, 8:23079 (R:US)
Program Management
Financial management in the oil-shale program, 8:23080 (R:US)
Project management in the oil shale program, 8:23078 (R:US)
LARGE COIL PROGRAM
Engineering, testing and manufacturing the general dynamics test coil for the Large Coil Program - an update, 8:25045 (J:US)
Latest status of the Japanese LCT coil and the domestic test facility, 8:25053 (J:US)
Manufacture of 16,000 amp superconducting conductor for the tokamak toroidal field coil program, 8:25019 (J:US)
Pool boiling superconducting coils for the Large Coil Task, 8:25036 (J:US)
Production experience: the Nb/sub 3/Sn forced flow conductor for the Large Coil Program, 8:25049 (J:US)
Progress renort on the tandem contribution to the IEA Large Coil Task, 8:25055 (J:US)
Results of the cooldown analysis of the Swiss LCT coil, 8:25054 (J:US)
Cooling Systems
Two-phase helium-IV quench analysis for superconducting magnets, 8:25010 (J:US)

Superconducting Magnets
General Dynamics superconducting magnet for the Large Coil Program: a progress report, 8:24119 (J:US)
Thermal Testing
Cryogenic voltage withstand and heat transfer tests for the General Electric large coil turn heaters, 8:25009 (J:US)

LARGE INTESTINE
Biomedical Radiography
The radiographic examination of the colon, 8:24344 (R:US)

LASER FUSION REACTORS
Electron beam transport through the atmosphere in reduced-density, current-carrying channels, 8:25153 (J:US)
First Wall
Liquid jet experiments: relevance to inertial confinement fusion reactors, 8:25156 (J:US)
Inertial Confinement
Liquid jet experiments: relevance to inertial confinement fusion reactors, 8:25156 (J:US)
Nuclear Pumping
Nuclear pumping of O/sub 2/(/sup 1//delta/) for laser fusion reactors, 8:25154 (J:US)

LASER IMPLOSIONS
Electron Drift
Transport effects with hot electrons in laser fusion. Final report, October 1, 1981-February 28, 1983, 8:24826 (R:US)

LASER RADIATION
Multiple Scattering
Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants, 8:24726 (R:US)
Wave Propagation
Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants, 8:24726 (R:US)

LASER SPECTROSCOPY
Accelerator Facilities
On-line laser spectroscopy with a cooled He-jet transport system, 8:24174 (R:US)
Fluorescence
Static-mode laser-fluorescence spectroscopy: a new technique for studying excitation mechanisms in particle-surface collisions, 8:24521 (R:US)

LASER-PRODUCED PLASMA
Electron Drift
Transport effects with hot electrons in laser fusion. Final report, October 1, 1981-February 28, 1983, 8:24826 (R:US)
Magnetic Fields
Some nonlinear estimates for lateral propagation of self-generated B fields, 8:24764 (R:US)
X-Ray Spectrometers
Laser fusion x-ray measurements, 8:24843 (RA:US)

LASERS
Light Amplification by Stimulated Emission of Radiation.
See also FREE ELECTRON LASERS
GAS LASERS
SOLID STATE LASERS
X-RAY LASERS
Diagnostic Techniques
Nova alignment and laser diagnostics systems - 1, 8:25146 (J:US)

LASL
Information Dissemination
Public access to classified reports at the Los Alamos Scientific Laboratory, 8:25282 (R:US)
Nuclear Materials Management
Operational advanced materials control and accountability system, 8:23198 (J:US)

LATENT HEAT STORAGE
Comparative Evaluations
Latent heat storage for solar energy systems, 8:23357 (R:XE:GE)

LATHES
Control Systems
BXAMER; hustler two-axis lathe APT postprocessor (CDC CYBER174,175; FORTRAN IV (greater than 99%) and COMPASS (less than 1%)), 8:24097 (R:US)
OKUMA; OKUMA two-axis lathe APT postprocessor (CDC CYBER174,175; FORTRAN IV (greater than 99%) and COMPASS (less than 1%)), 8:24098 (R:US)

LATTICE FIELD THEORY
Monte Carlo Method
U(3) four-dimensional lattice gauge theory and Monte Carlo calculations, 8:24635 (J:NL)

LATTICES (CRYSTAL)
See CRYSTAL LATTICES

LATTICES (REACTOR)
See REACTOR LATTICES

LAWRENCE LIVERMORE LABORATORY
Program Management
Costly delays in the purchase of a scientific computer for the Solar Energy Research Institute, 8:25227 (R:US)

LAWS
Implementation
6th annual report to Congress for fiscal year 1982. Electric and Hybrid Vehicles Program, 8:23886 (R:US)

LAWSUITS
Document Destruction
Investigation of questions of possible document destruction by the Office of Special Counsel for Compliance, 8:25225 (R:US)

LEACHATES
Chemical Analysis
Hydrologic resource research, 8:23091 (RA:US)
Chemical Composition
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)

LEAD
Antiproton Reactions
Effects of strong attraction in antiproton-nucleus scattering, 8:24621 (RA:US)
Biological Effects
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Body Burden
Smoking, infant birthweight and lead burden in developing children, 8:24459 (J:US)
Ecological Concentration
Analysis of tapwater lead concentration in homes of children with undue body lead burden, 8:24300 (J:US)
Cadmium and lead contaminated soils in some British metal mining areas, 8:24260 (J:US)
Environmental pollution control at the AMAX-Homestake lead smelter, 8:24245 (J:US)
Heavy metals in the environs of a smelter, 8:24292 (J:US)
Role of soil ingestion in the intake of metals by livestock, 8:24474 (J:US)
Environmental Exposure Pathway
Lead and iron status of breast and formula-fed infants, 8:24468 (J:US)
Role of soil ingestion in the intake of metals by livestock, 8:24474 (J:US)
Metabolism
Analysis of tapwater lead concentration in homes of children with undue body lead burden, 8:24300 (J:US)
Analytical measurements of selected metals in samples from a human metabolic study, 8:24473 (J:US)
Comparative toxicity to weanling and adult rats of lead acetate in water, 8:24465 (J:US)
Effect of dietary lead and calcium on tissue lead accumulation and depletion in sheep, 8:24470 (J:US)
Effects of supplemental mangesium on blood and tissue lead levels and toxicity of ingested lead in the rat, 8:24469 (J:US)
Lead and iron status of breast and formula-fed infants, 8:24468 (J:US)
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Removal
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
Tissue Distribution
Cardiovascular toxicology, 8:24447 (RA:US)

Toxicity
Cardiovascular toxicology, 8:24447 (RA:US)
Comparative toxicity to weanling and adult rats of lead acetate in water, 8:24465 (J:US)
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)

LEAD 192
Gyromagnetic Ratio
G-factor of the 12^+ isomer in ^{192}Pb, 8:24697 (RA:DE:In German)

LEAD 208 TARGET
Carbon 12 Reactions
^{12}C and ^{8}Be production in $^{12}C+^{208}Pb$ collisions, 8:24701 (J:NL)
Spin orbit interaction of ^{12}C and ^{11}B, 8:24692 (RA:DE:In German)

LEAD 210
Activity Levels
Estimation of the cumulative exposure to uranium mine atmospheres by in vivo mesurements of lead-210 in the skull, 8:24736 (RA:US)
Radioecological Concentration
Radioactivity in groundwater associated with uranium and phosphate mining and processing, 8:24298 (J:US)
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)
Spatial Distribution
Estimation of the cumulative exposure to uranium mine atmospheres by in vivo mesurements of lead-210 in the skull, 8:24736 (RA:US)

LEAD 212
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)

LEAD 214
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)

LEAD ALLOYS
Melting
Liquid Li-Pb-Bi, a new tritium breeder, 8:24958 (J:US)

LEAD COMPOUNDS
Environmental Transport
Lake acidification: its effect on lead mobility in the sediment of two Adirondack lakes, 8:24289 (RA:US)

LEAD-ACID BATTERIES
Design
Bipolar lead accumulator cell with high energy density, 8:23671 (R:DE:In German)
Development of a lead tetrafluoroborate accumulator, 8:23670 (R:DE:In German)
Development of unique lightweight high-performance lead-acid batteries, 8:23673 (R:US)
Electrodes
Lead deficiency and hydrogen content in battery electrode beta-PbO_2, 8:23684 (J:US)
Fabrication
Bipolar lead accumulator cell with high energy density, 8:23671 (R:DE:In German)
Performance
Development of unique lightweight high-performance lead-acid batteries, 8:23673 (R:US)
Performance Testing
Development of a lead tetrafluoroborate accumulator, 8:23670 (R:DE:In German)
Research Programs
Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program, 8:23676 (R:US)

LEAK DETECTORS
Leak detection inside a vacuum vessel, 8:25208 (J:US)

LEASES
Management
Improvements needed in the cash management practices of Interior's simultaneous oil and gas leasing program in Wyoming, 8:23724 (R:US)

LEAST SQUARE FIT
Optimization
LCLSQ1; linear least squares with constraints (IBM303x,360,370; FORTRAN), 8:25264 (R:US)

LEAVES
Biodegradation
Allochthonous litter decomposition in three Adirondack lakes, 8:24284 (RA:US)

LEGAL ASPECTS
Bibliographies
Title list of documents made publicly available, December 1-31, 1982, 8:23525 (R:US)

LEGUMINOSAE
See also ALFALFA
GLYCINE HISPIDA
Productivity
Ozone impacts on the productivity of selected crops (Corn, wheat, soybean and peanut crops), 8:24403 (R:US)

LEPTON-NUCLEON INTERACTIONS
See also ELECTRON-NUCLEON INTERACTIONS
Deep Inelastic Scattering
Nature of nonperturbative effects in lepton-nucleon scattering, 8:24624 (J:US)

LEUCOCYTES
See LEUKOCYTES

LEUKEMIA
See also MYELOID LEUKEMIA
Radioinduction
Carcinogenesis following prenatal exposure to radiation, 8:24395 (J:DE)

LEUKEMIA VIRUSES
DNA-Cloning
Molecular genetics of carcinogenesis, 8:24387 (RA:US)

LEUKOCYTES
See also LYMPHOCYTES
Temperature Effects
Theoretical and applied cryobiology, 8:24397 (RA:US)

LEVEL INDICATORS
Development of an improved-contact liquid-level probe for pressurized reactor vessels, 8:23495 (R:US)
Design
Liquid level sensing device, 8:23506 (P:US)

LIDAR
See OPTICAL RADAR

LIGHT SCATTERING
Analytical Solution
MIE scattering theory for particle sizing interferometry with the dual beam laser velocimeter, 8:23773 (R:US)

LIGHT WATER COOLED REACTORS
See WATER COOLED REACTORS

LIGHTING SYSTEMS
Control Systems
Occupancy-controlled lighting: energy-savings demonstration and analysis, 8:23825 (R:US)
Electromagnetic Radiation
Biological effects of radio-frequency radiation, 8:23820 (RA:US)
Energy Efficiency
EMI measurements of lighting systems, 8:23824 (RA:US)
Fluorescent Lamps
Conducted and radiated signatures of fluorescent lamp systems in C and I environments, 8:23823 (RA:US)
Interference
Conducted and radiated signatures of fluorescent lamp systems in C and I environments, 8:23823 (RA:US)
EMI measurements of lighting systems, 8:23824 (RA:US)
Lighting-electromagnetic compatibility conference: proceedings, 8:23819 (R:US)
Reduction of AM radio interference through control of radiated electric field, 8:23821 (RA:US)
Meetings
Lighting-electromagnetic compatibility conference: proceedings, 8:23819 (R:US)

LIGHTNING ARRESTERS
Design
Metal-oxide surge arresters for gas-insulated systems, Phases I and II. Final report, 8:23438 (R:US)
Performance
Metal-oxide surge arresters for gas-insulated systems, Phases I and II. Final report, 8:23438 (R:US)
LIGNITE
Chemical Composition
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VIII. Coal quality analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23236 (R:US)
Pyrolysis
Coal pyrolysis by hot dolomitic solids from a fluidized bed combustor, 8:22902 (RA:CA)
LIME-LIMESTONE WET SCRUBBING PROCESSES
Mathematical Models
Advanced environmental control technology , 8:22952 (R:US)
Research Programs
Advanced environmental control technology , 8:22952 (R:US)
LIMESTONE
Elutriation
Standardized test methods for investigating attrition and elutriation characteristics of natural sorbents in fluidized-bed coal combustors, 8:24149 (R:US)
Fragmentation
Standardized test methods for investigating attrition and elutriation characteristics of natural sorbents in fluidized-bed coal combustors, 8:24149 (R:US)
Sorptive Properties
Exploratory and basic fluidized-bed combustion studies. Annual report, October 1980-September 1981, 8:24148 (R:US)
LIMITER CIRCUITS
Design
Development of a dc current limiting interrupting system for mines. Open file report Jun 79-Sep 81, 8:24109 (R:US)
LIMITERS
Coatings
Thermal fatigue testing of low-Z coatings on molybdenum and Inconel 625, 8:24907 (J:NL)
Computerized Simulation
Physics of particle exhaust in pump limiters, 8:24853 (J:NL)
Degassing
Outgassing characteristics of TiC coated materials, 8:24909 (J:NL)
Design
Design and analysis of the TFTR fixed limiters - 1, 8:25201 (J:US)
Design and analysis of the TFTR fixed limiters - 2, 8:25202 (J:US)
Design and mechanical analysis of TORE SUPRA vacuum vessels and limiters, 8:25207 (J:US)
Design of actively cooled limiters for Alcator A and C, 8:25210 (J:US)
Key design issues in the definition of the fusion engineering device (FED) first wall and limiter features, 8:24961 (J:US)
Tokamak limiter design, 8:25200 (J:US)
Erosion
Can wall and limiter erosion be eliminated in fusion reactors?, 8:24966 (J:US)
Damage and modifications in the Frascati tokamak limiter, 8:24897 (J:NL)
Erosion and redeposition analysis for limiter and divertor impurity control systems, 8:24878 (J:NL)
Pumping and erosion rates for the TFTR and INTOR/FED limiter designs, 8:24856 (J:NL)
Redeposition of the sputtered surface in limiters, 8:25166 (J:US)
Self-sustaining erosion-resistant low z coatings for first wall and limiter applications I: theory, 8:24967 (J:US)
Flow Models
Theoretical model for hot plasma flowing to a wall with recycling, 8:24870 (J:NL)
Life Span
Redeposition of the sputtered surface in limiters, 8:25166 (J:US)
Maintenance
Can wall and limiter erosion be eliminated in fusion reactors?, 8:24966 (J:US)
Materials Testing
Limiter, of dense and high thermal conducting material, for a fusion reactor, 8:25159 (J:US)
Performance
Experimental studies on pump limiters, 8:24850 (J:NL)
Test of a toroidal large area limiter in the ASDEX tokamak, 8:24859 (J:NL)
Sputtering
Redeposition of the sputtered surface in limiters, 8:25166 (J:US)
LINACS
See LINEAR ACCELERATORS
LINEAR ACCELERATORS
See also FMIT LINAC
HILACS
LAMPF LINAC
MIT BATES LINAC
QUADRUPOLE LINACS
High-Voltage Pulse Generators
IBEX foilless diode experiments, 8:24187 (R:US)
Kilo Amp Beam Currents
Recent performance improvements on FXR, 8:24189 (R:US)
LASL
Los Alamos: present projects in accelerator technology, 8:24163 (J:XC)
Test Facilities
Development of the rf linear accelerator test bed for heavy-ion fusion, 8:24822 (R:US)
LINEAR Z PINCH DEVICES
Computer Calculations
Superfast Z-pinch-produced plasmas, 8:24760 (R:US)
LINERS
Decision-tree approach to evaluating inactive uranium-processing sites for liner requirements, 8:23161 (R:US)
Deformation
Surface interactions in a reverse field pinch, 8:24887 (J:NL)
Erosion
Surface interactions in a reverse field pinch, 8:24887 (J:NL)
LIQUEFIED NATURAL GAS
Gas Spills
BAGI: a technique for the detection and tracking of large gas clouds, 8:23070 (R:US)
Denser-than-air dispersion modeling in the atmosphere, 8:23071 (R:US)
Large-scale hazardous gas release experiments, 8:23069 (R:US)
Predicting hazards from large spills of liquefied gases, 8:23067 (RA:US)
LIQUEFIED PETROLEUM GASES
Underground Storage
Geological and geotechnical studies for the construction of pilot caverns in rock for the storage of crude oil, hydrocarbon products and LPG, 8:23045 (R:DE:In German)
LIQUEFIERS
See CONDENSERS
LIQUID CRYSTALS
Phase Transformations
Phase transitions in high magnetic fields, 8:23888 (R:US)
LIQUID FLOW
Flow Stress
Experimental investigation of the unsteady one-phase flow through perforated plates, 8:23620 (R:DE:In German)
LIQUID FUELS
See also FUEL OILS
GASOLINE
KEROSENE
Production
Update of the 'development of alternate liquid fuels'. Paper 81.24.7, 8:23867 (J:US)
Research Programs
Transportation fuels from indirect coal liquefaction (US DOE; reviews and considers work in other countries), 8:22918 (R:US)
LIQUID METAL COOLANT
See LIQUID METALS

LIQUID METAL COOLED REACTORS
See also LMFBR TYPE REACTORS
Design
Sealing arrangement with annular flexible disc, 8:23520 (P:US)
Sealing Materials
Sealing arrangement with annular flexible disc, 8:23520 (P:US)
LIQUID METAL TEST FACILITIES
See TEST FACILITIES
LIQUID METALS
Electric Conductivity
Universal behavior in the electrical conductivity of strong-scattering expanded fluid metals, 8:24572 (J:US)
Electronic Structure
Universal behavior in the electrical conductivity of strong-scattering expanded fluid metals, 8:24572 (J:US)
Entropy
Predissociation in an intense electromagnetic field, 8:24754 (J:US)
Free Energy
Predissociation in an intense electromagnetic field, 8:24754 (J:US)
Two-Phase Flow
Effect of a transverse magnetic field on liquid metal two-phase flow pattern, 8:24922 (J:US)
LIQUID SCINTILLATION DETECTORS
Neutron Detection
Measurement of neutron multiplicity distributions with scintillator tank, 8:24198 (RA:DE:In German)
LIQUID-METAL MHD GENERATORS
Performance
Solar liquid-metal MHD performance predictions, 8:23299 (R:US)
Solar Collectors
Solar liquid-metal MHD performance predictions, 8:23299 (R:US)
LIQUIDS
See also COAL LIQUIDS
LIQUID CRYSTALS
LIQUID METALS
Level Indicators
Liquid level sensing device, 8:23506 (P:US)
LITEK LAMP
See FLUORESCENT LAMPS
LITHIUM
Correlation Functions
New look at correlations in atomic and molecular systems. I. Application of fermion Monte Carlo variational method, 8:24564 (J:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
LITHIUM 6
Hypernuclei
Preliminary report on an experiment to observe Σ hypernuclei in the 1p shell nuclei, 8:24595 (RA:US)
LITHIUM 7
E2-Transitions
Microscopic calculations of the transition probability and E2 form factor of ^{7}Li and ^{7}Be, 8:24646 (RA:DE:In German, English)
LITHIUM ALLOYS
See also LITHIUM BASE ALLOYS
Melting
Liquid Li-Pb-Bi, a new tritium breeder, 8:24958 (J:US)
LITHIUM BASE ALLOYS
Oxidation
Effect of trace alloying additions on the high-temperature oxidation of Al-4.2 wt % Mg and Al-3 wt % Li alloys, 8:23926 (RA:US)
LITHIUM COMPOUNDS
See also LITHIUM OXIDES
Crystal Structure
Neutron powder diffraction study of the lithium insertion compound $LiMoO_2$ from 4 to 440°k, 8:24044 (J:GB)
Magnetic Susceptibility
Neutron powder diffraction study of the lithium insertion compound $LiMoO_2$ from 4 to 440°k, 8:24044 (J:GB)
LITHIUM IONS
Ion-Atom Collisions
Molecular binding effects in electron capture in $Li^+ + H$ collisions, 8:24531 (RA:DE:In German)
LITHIUM OXIDES
Physical Properties
Solid oxide compounds - properties necessary for fusion applications, 8:24959 (J:US)
Thermal Conductivity
Solid oxide compounds - properties necessary for fusion applications, 8:24959 (J:US)
LITHIUM-SULFUR BATTERIES
Electrodes
Applications of the DC-relaxation technique in Li-Al/FeS cell development, 8:23677 (R:US)
Electrode characterization of Li-Al/FeS cells, 8:23674 (R:US)
Performance
Electrode characterization of Li-Al/FeS cells, 8:23674 (R:US)
Performance Testing
Current-pulse measurements of Li-Al/FeS cells, 8:23675 (R:US)
Performance of a 10-cell LiAl/metal sulfide battery, 8:23672 (R:US)
Reviews
Current status of the lithium/metal sulfide system, 8:23678 (R:US)
LITIGATION
See LAWSUITS
LMFBR TYPE REACTORS
See also CLINCH RIVER BREEDER REACTOR
ENRICO FERMI-1 REACTOR
Containment Buildings
Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory, 8:23595 (R:US)
Containment Systems
Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5, 8:23617 (R:US)
Core Catchers
Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory, 8:23595 (R:US)
Crack Propagation
Modeling of crackling of sodium-concrete reactions, 8:23641 (J:US)
ECCS
Emergency core cooling system, 8:23521 (P:US)
Failed Element Detection
DN detection during SLSF tests, 8:23587 (R:US)
Fires
SOMIX1; sodium spray fires in cylindrical cell (IBM370; FORTRAN IV H Extended), 8:23508 (R:US)
Fuel Element Failure
BEHAVE-SST; overpower transient fuel mechanics (CDC7600; FORTRAN IV), 8:23512 (R:US)
Fuel Pins
PFR/TREAT programme: objectives, progress and future work, 8:23590 (R:US)
Fuel Rods
Design, fabrication, and performance of high burn-up sphere-pac fuel rods, 8:23517 (RA:US)
Fuel-Cladding Interactions
Fuel - cladding gap conductance measurements using Kalman filter methods, 8:23546 (J:US)
Heat Exchangers
Thermomechanical analysis of a SPX 1 type sodium-air heat exchanger, 8:23515 (R:IT:IT)
Loss of Flow
Analysis of recent fuel-disruption experiments, 8:23589 (R:US)
Status of fast-breeder-reactor safety, 8:23602 (R:US)
Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations, 8:23605 (R:US)
Meltdown
Effect of particle stratification on debris-bed dryout, 8:23598 (R:US)

Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium, 8:23596 (R:US)
Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory, 8:23595 (R:US)
Interaction and penetration of heated UO_2 with limestone concrete, 8:23597 (R:US)
Preliminary results of the first four TRAN fuel freezing experiments, 8:23649 (J:US)
Molten Metal-Water Reactions
PTA1; pipe system pressure analysis (IBM370/195; FORTRAN IV), 8:23510 (R:US)
Pressure Gradients
PTA1; pipe system pressure analysis (IBM370/195; FORTRAN IV), 8:23510 (R:US)
Reactor Accidents
Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5, 8:23617 (R:US)
CACECO; LMFBR containment accident analysis (CDC CYBER74;CDC7600; CDC FORTRAN Extended with only a few statements that do not comply with the American National Standards Institute (ANSI) FORTRAN.), 8:23511 (R:US)
HAARM3; aerosol behavior log-normal dist model (CDC6400,7600,CYBER73; FORTRAN IV, FTN4.5 (CDC7600)), 8:23582 (R:US)
MAEROS user manual (LMFBR), 8:23627 (R:US)
NALAP; LMFBR transient response to accident (CDC7600,CYBER76; FORTRAN IV (99%) and COMPASS (1%)), 8:23581 (R:US)
Reactor Core Disruption
An assessment of SIMMER-11 freezing, melting, and plugging calculations, 8:23646 (J:US)
An improved quasistatic method for transition-phase calculations, 8:23657 (J:US)
Application of debris-bed dryout data to CONACS-1 modeling, 8:23599 (R:US)
Effect of particle stratification on debris-bed dryout, 8:23598 (R:US)
Experimental investigation of the unsteady one-phase flow through perforated plates, 8:23620 (R:DE:In German)
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium, 8:23596 (R:US)
Interaction and penetration of heated UO_2 with limestone concrete, 8:23597 (R:US)
Phenomenological studies of HCDA issues, 8:23594 (R:US)
Role of fuel power in HCDA early fuel dispersal, 8:23650 (J:US)
Selection of low-risk design guidelines for energetic events, 8:23591 (R:US)
Status and validation of the SAS4A accident-analysis code system, 8:23592 (R:US)
The effects of flowing fuel particulate on bulk freezing predictions, 8:23647 (J:US)
Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations, 8:23605 (R:US)
Reactor Core Restraints
Core restraint analysis of a free-flowering large heterogeneous LMFBR, 8:23644 (J:US)
NUBOW-2D Inelastic; bowed reactor core analysis (IBM370; FORTRAN IV), 8:23514 (R:US)
Reactor Materials
Calculation of thermophysical properties of sodium, 8:23516 (R:US)
Spent Fuel Elements
Effect of high solvent radiation exposures on TBP processing of spent LMFBR fuels, 8:23519 (R:US)
Steam Generators
Foster Wheeler protected bayonet-tube steam-generator conceptual designs, 8:23518 (R:US)
Stress Analysis
AXICRP; finite element code for creep analysis (CDC6600,7600,CYBER74; FORTRAN IV), 8:23513 (R:US)
System Failure Analysis
Structures for common-cause failure analysis, 8:23586 (R:US)
Transient Overpower Accidents
Analyses with the FSTATE code: fuel performance in destructive in-pile experiments, 8:23588 (R:US)
PFR/TREAT CO1 and LO1 experiments, 8:23593 (R:US)
Status of fast-breeder-reactor safety, 8:23602 (R:US)

LNG
See LIQUEFIED NATURAL GAS

LNG SPILLS
See GAS SPILLS

LOAD MANAGEMENT
Implementation
Issues in implementing a load-management program for direct load control. Final report, 8:23744 (R:US)
Planning
Issues in implementing a load-management program for direct load control. Final report, 8:23744 (R:US)

LOADING MACHINES (REACTOR)
See REACTOR CHARGING MACHINES

LOCA
See LOSS OF COOLANT

LONGITUDINAL PINCH DEVICES (LINEAR)
See LINEAR Z PINCH DEVICES

LONGWALL MINING
Backfilling
Investigations into monolithic pump packing as a means of underground roof support. Part B: field trials at South Bulli 'B' Mine and mathematical modelling, 8:22967 (R:AU)
Dusts
Research on air sprays and unique foam-application methods. Phase II-B report: laboratory investigation of air sprays, 8:22980 (R:US)
Powered Supports
Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls, 8:22978 (R:US)
Productivity
Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries, 8:22977 (R:PL)

LOS ALAMOS MESON PHYSICS FACILITY
See LAMPF LINAC

LOS ALAMOS SCIENTIFIC LABORATORY
See LASL

LOSS OF COOLANT
Computer Codes
BEACON/MOD3; containment system fluid flow (CDC CYBER176;CDC7600; FORTRAN IV (98%) and COMPASS (2%)), 8:23579 (R:US)
Computerized Simulation
TRAC-PD2/MOD1; best-estimate analysis PWR LOCA (CDC7600; FORTRAN IV (FTN 4.5 FORTRAN compiler) with selected COMPASS replacement routines), 8:23585 (R:US)
Heat Transfer
BWR refill-reflood program - TRAC-BWR component development, 8:23609 (R:US)
Hydraulics
BWR refill-reflood program - TRAC-BWR component development, 8:23609 (R:US)
Reactor Safety Experiments
Analysis of the BCL transient ECC bypass test with the TRAC-PD2/MOD1 code, 8:23652 (J:US)
Test Facilities
Application of a honeycomb insulator design in a variable high-temperature, high-pressure environment, 8:23658 (J:US)
Thermal Stresses
LOCA analysis of annular fuel pellet design for extended burnup (PWR), 8:23606 (RA:US)
Thermal and mechanical behaviour of PWR fuel rod simulators for LOCA-experiments, 8:23619 (R:DE)

LOSS OF FLOW
Status of fast-breeder-reactor safety, 8:23602 (R:US)

After-Heat Removal
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
NATBWR: a steady-state model for natural circulation in boiling-water reactors, 8:23612 (R:US)
Fuel Element Failure
Analyses with the FSTATE code: fuel performance in destructive in-pile experiments, 8:23588 (R:US)
Analysis of recent fuel-disruption experiments, 8:23589 (R:US)
Fuel Motion Detection
New aspects in the analysis of fuel dynamics during loss-of-flow transients, 8:23645 (J:US)
Heat Transfer
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
NATBWR: a steady-state model for natural circulation in boiling-water reactors, 8:23612 (R:US)
Scaling criteria for LWR's under single-phase and two-phase natural circulation, 8:23603 (R:US)
Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations, 8:23605 (R:US)
Hydraulics
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
NATBWR: a steady-state model for natural circulation in boiling-water reactors, 8:23612 (R:US)
Scaling criteria for LWR's under single-phase and two-phase natural circulation, 8:23603 (R:US)
Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations, 8:23605 (R:US)

LOUISIANA
Coastal Regions
Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, 8:24267 (R:US)
Land Reclamation
Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, 8:24267 (R:US)
Wetlands
Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, 8:24267 (R:US)

LOW BTU GAS
150 to 250 Btu/ft³.
Calorific Value
Combustion Engineering two-stage, atmospheric-pressure, entrained-flow coal-gasification-process development-unit program. Final report, 8:22931 (R:US)
Production
Gas generation of low b.t.u. fuel gas from agricultural residues. Final report, 8:23225 (R:US)

LOW INCOME GROUPS
Energy Conservation
Weatherization program in West Virginia, 8:23812 (R:US)
Fuel Consumption
Residential fuel comparison patterns for poor, black, and elderly households: a comparative study. Vol I. Data base development, 8:23793 (R:US)

LOW-BETA PLASMA
Beta from 0 to 0.01.
Electric Fields
Plasma convection and line-tying, 8:24788 (J:US)
Motion
Plasma convection and line-tying, 8:24788 (J:US)

LOW-HEAD HYDROELECTRIC POWER PLANTS
Prior to August 1978 HYDROELECTRIC POWER PLANTS was used.
Design
Upper Mechanicville Hydroelectric Redevelopment Project: project-management plan. Small-Scale Hydroelectric Power Demonstration Project, 8:23245 (R:US)
Economic Analysis
Upper Mechanicville Hydroelectric Redevelopment Project: project-management plan. Small-Scale Hydroelectric Power Demonstration Project, 8:23245 (R:US)

LOW-LEVEL RADIOACTIVE WASTES
Leaching
Influence of leach rate and other parameters on groundwater migration, 8:23184 (R:US)
Radioactive Waste Processing
On-line, real-time measurements of decontamination factors for a low-level waste incinerator, 8:23179 (J:NL)

LP-GAS
See LIQUEFIED PETROLEUM GASES

LUNGS
Radionuclide Kinetics
Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R:US)

LWR TYPE REACTORS
See WATER COOLED REACTORS

LYMPHOBLASTOMAS
See LYMPHOMAS

LYMPHOCYTES
Genetic Radiation Effects
Induction of chromosome aberrations, sister chromatid exchanges and specific locus mutations by radiation and chemicals, and the application of the studies to population monitoring and risk estimation, 8:24376 (RA:US)

LYMPHOGRANULOMAS
See LYMPHOMAS

LYMPHOID CELLS
See LYMPHOCYTES

LYMPHOMAS
Leukemogenesis
Radiation immunology (X radiation), 8:24386 (RA:US)

M

M1-TRANSITIONS
Magnetic dipole transitions.
Role of M1 transitions in the quasicontinuum, 8:24672 (R:US)

MA 754
See NICKEL BASE ALLOYS

MA 956
See IRON BASE ALLOYS

MACHINE TOOLS
See also LATHES
Control Systems
ADVCON; advance control 93 APT postprocessor (CDC CYBER174,175; FORTRAN IV), 8:24095 (R:US)
PTTOPT; point-to-point tool APT postprocessor (CDC CYBER174,175; FORTRAN IV), 8:24096 (R:US)

MAGNESIUM
Biological Effects
Effects of supplemental mangesium on blood and tissue lead levels and toxicity of ingested lead in the rat, 8:24469 (J:US)
Metabolism
Zinc and magnesium concentrations in plasma and red blood cells in patients on digitalis medication, 8:24462 (J:US)
Toxicity
Enzyme and gene regulation in Drosophila, 8:24412 (RA:US)
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)

MAGNESIUM 24 TARGET
Carbon 12 Reactions
Measurement of elastic and inelastic scattering of ^{12}C on light target nuclei with high angular resolution, 8:24649 (RA:DE:In German)
Carbon 13 Reactions
Reaction model for the description of spin-flip in the inelastic scattering of $^{12}C + {}^{24}Mg \rightarrow {}^{12}C' + {}^{24}Mg^{*}(2^{+})$, 8:24652 (RA:DE:In German, English)
Oxygen 16 Reactions
Resonances in s-d shell nuclei, 8:24651 (R:US)

MAGNESIUM ALLOYS
See also MAGNESIUM BASE ALLOYS

Fractures
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)
Intergranular Corrosion
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)
Stress Corrosion
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)

MAGNESIUM BASE ALLOYS
Oxidation
Effect of trace alloying additions on the high-temperature oxidation of Al-4.2 wt % Mg and Al-3 wt % Li alloys, 8:23926 (RA:US)

MAGNESIUM OXIDES
Breakdown
High field conduction and dielectric breakdown in nominally pure and nickel-doped MgO crystals at high temperatures, 8:24009 (J:US)
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Dielectric Properties
High field conduction and dielectric breakdown in nominally pure and nickel-doped MgO crystals at high temperatures, 8:24009 (J:US)
Electric Conductivity
High field conduction and dielectric breakdown in nominally pure and nickel-doped MgO crystals at high temperatures, 8:24009 (J:US)
Interfaces
Formation energy of point defects in free surfaces and grain boundaries in MgO, 8:24000 (R:US)
Point Defects
Formation energy of point defects in free surfaces and grain boundaries in MgO, 8:24000 (R:US)
Surface Properties
Imaging and analysis of surfaces using diffracted electrons, 8:24068 (BA:US)
Thermal Conductivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
Thermal Diffusivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)

MAGNET COILS
Analysis and design of short, iron-free dipole magnets, 8:25222 (J:US)
Cooling
TMX upgrade magnet system mechanical issues, 8:24845 (R:US)
Design
Analysis of external hybrid poloidal coil system, 8:24994 (J:US)
Design and fabrication considerations for normal copper pf coils located inside tf coils to facilitate replacement, 8:24918 (J:US)
Engineering design and construction of the S-1 spheromak coil systems, 8:25034 (J:US)
Epoxy impregnation system for TFTR large coil program, 8:24919 (J:US)
Fatigue design of the poloidal field coil for JT-60 tokamak machine, 8:25000 (J:US)
Normal conducting steady-state toroidal magnet systems for large tokamaks, 8:24997 (J:US)
Optimisation of the poloidal field coil system in pulsed tokamaks, 8:24996 (J:US)
Eddy Currents
Eddy current load estimation for toroidal shells as a result of plasma disruptions, 8:24990 (J:US)
Eddy current calculations for the tokamak fusion reactor through fields harmonics content, 8:24998 (J:US)
Electric Currents
Generation of multipole nulls in a tokamak geometry, 8:24995 (J:US)
Electrical Insulation
Electrical insulation qualification tests for TFTR TF and PF coils, 8:25007 (J:US)
Electrical Testing
Electrical insulation qualification tests for TFTR TF and PF coils, 8:25007 (J:US)
Electrical Transients
Calculation of transient current response of a set of coupled circuits using an eigenvalue technique, 8:24992 (J:US)
Fatigue
Fatigue design of the poloidal field coil for JT-60 tokamak machine, 8:25000 (J:US)
Magnetic Field Configurations
Pf coil current sheets for circular section tori to produce specified internal fields, 8:24993 (J:US)
Maintenance
Considerations for replacing PF coils on FED, 8:25047 (J:US)
Materials Testing
Selection and application of C18200 chrome copper for the OHTE confinement test helical coil, 8:25008 (J:US)
Molding Materials
Description of the molding system for the epoxy impregnation of the TFTR poloidal field coils, 8:25021 (J:US)
Optimization
Optimisation of the poloidal field coil system in pulsed tokamaks, 8:24996 (J:US)
Power Supplies
Power supply for the poloidal coil of tokamak fusion reactor, 8:25074 (J:US)
Stress Analysis
Bitter-type magnet plate design with compound conductor of ultrahigh mechanical strength, 8:25003 (J:US)
Nonlinear stress analysis of the poloidal field coil for JT-60 tokamak machine, 8:24999 (J:US)
On mechanical stresses in solenoids constructed of transversely isotropic materials, 8:25002 (J:US)
Supports
Development of tf coil support concepts by design methodology in the case of a Bitter-type magnet (Bitter-type magnets), 8:25004 (J:US)
Testing
Load tests of a large coil, 8:25001 (J:US)
Thermal Stresses
Load tests of a large coil, 8:25001 (J:US)

MAGNETIC ANALYZERS
Magnetic Fields
Field studies of an analyzing magnet and calculation of ion trajectories for charge exchange experiments, 8:24178 (RA:DE:In German)
Particle Tracks
Field studies of an analyzing magnet and calculation of ion trajectories for charge exchange experiments, 8:24178 (RA:DE:In German)

MAGNETIC BREMSSTRAHLUNG
See SYNCHROTRON RADIATION

MAGNETIC CIRCUITS
Electrical Testing
Magnetizing circuit of TEXTOR, 8:25029 (J:US)

MAGNETIC COILS
See MAGNET COILS

MAGNETIC DIPOLE TRANSITIONS
See M1-TRANSITIONS

MAGNETIC ENERGY STORAGE
See also SUPERCONDUCTING MAGNETIC ENERGY STORAGE
Energy dump concept for large energy storage coils (Energy dump concept), 8:25030 (J:US)

MAGNETIC FIELD CONFIGURATIONS
For pinch configurations, use the narrower terms of PINCH EFFECT.
Stability
Magnetohydrodynamic stability of magnetic slabs, 8:24848 (J:US)

MAGNETIC FIELDS
Measuring Methods
Locating a buried magnetic dipole, 8:24155 (J:US)

Phase Transformations
Phase transitions in high magnetic fields, 8:23888 (R:US)
MAGNETIC MATERIALS
See also ANTIFERROMAGNETIC MATERIALS
FERRIMAGNETIC MATERIALS
FERROMAGNETIC MATERIALS
Electronic Structure
SCF-X alpha-SW cluster molecular-orbital models of catalysts, alloys, magnetic materials, and superconductors. Interim report, 8:23891 (R:US)
Phase Transformations
Phase transitions in high magnetic fields, 8:23888 (R:US)
MAGNETIC MIRROR CONFIGURATIONS
ECR Heating
Plasma potential in a magnetic mirror with electron-cyclotron-resonance heating, 8:24761 (R:US)
MAGNETIC MIRROR TYPE REACTORS
See also FIELD-REVERSED MIRROR REACTORS
TMR REACTORS
Environmental Impacts
Environment and safety: major goals for MARS, 8:24846 (R:US)
Radioactive Waste Disposal
Environment and safety: major goals for MARS, 8:24846 (R:US)
MAGNETIC SEPARATORS
Operation
Waste-water treatment process, 8:24146 (TG:US)
Reviews
Application of HGMS in coal preparation (Both wet and dry separations), 8:22986 (R:US)
MAGNETIC SPECTROMETERS
Fabrication
Los Alamos Meson Physics Facility high-resolution-spectrometer dipole magnets: a summary report, 8:24184 (R:US)
Position Sensitive Detectors
Measurement of the scattering angle at the entrance of the magnetic spectrometer with a position-sensitive parallel-plate avalanche counter, 8:24199 (RA:DE:In German)
Two-dimensional position-sensitive parallel-plate avalanche counter for the magnetic spectrometer, 8:24200 (RA:DE:In German)
Specifications
Los Alamos Meson Physics Facility high-resolution-spectrometer dipole magnets: a summary report, 8:24184 (R:US)
MAGNETOHYDRODYNAMIC CHANNELS
See MHD CHANNELS
MAGNETOHYDRODYNAMIC GENERATORS
See MHD GENERATORS
MAGNETOSPHERE
Auroral Zones
Theory of the auroral magnetosphere, 8:24509 (R:US)
Energy Transfer
Theory of the auroral magnetosphere, 8:24509 (R:US)
MAGNETS
Meetings
International Conference on Magnet Technology, 7th, MT-7, 1981, 8:24116 (J:US)
MAIZE
Genetic Mapping
Transposable elements and genetic instabilities in crop plants, 8:24339 (J:US)
Genetics
Organization of the R chromosome region in maize, 8:24328 (R:US)
Productivity
Ozone impacts on the productivity of selected crops (Corn, wheat, soybean and peanut crops), 8:24403 (R:US)
MALIGNANCIES
See NEOPLASMS
MAMMALS
See also CETACEANS
Population Dynamics
Existing programs, technology, and requirements relative to the conservation and protection of marine mammals in the US fishery conservation zone and in the southern ocean, 8:24271 (R:US)
Research Programs
Existing programs, technology, and requirements relative to the conservation and protection of marine mammals in the US fishery conservation zone and in the southern ocean, 8:24271 (R:US)
MAMMARY GLANDS
Neoplasms
Breast cancer among atomic bomb survivors, Hiroshima and Nagasaki, 1950-1969. Pathologic features, 8:24357 (R:US)
Pathological Changes
Breast cancer among atomic bomb survivors, Hiroshima and Nagasaki, 1950-1969. Pathologic features, 8:24357 (R:US)
MAN
All of mankind, of any age or of either sex.
See also MEN
Sensitivity
Ebb and flow of manganese: a possible pathogenic factor in birth defects, cancer and heart disease, 8:24457 (J:US)
MANGANESE
Biological Effects
Effect of dietary manganese on the respiratory activity of liver mitochondria, 8:24466 (J:US)
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Catalytic Effects
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R:US)
Ecological Concentration
Heavy metals in the environs of a smelter, 8:24292 (J:US)
Metabolism
Analytical measurements of selected metals in samples from a human metabolic study, 8:24473 (J:US)
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Toxicity
Ebb and flow of manganese: a possible pathogenic factor in birth defects, cancer and heart disease, 8:24457 (J:US)
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
MANGANESE OXIDES
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Phase Transformations
Phase transitions in high magnetic fields, 8:23888 (R:US)
Self-Diffusion
Diffusion mechanisms in transition-metal oxides, 8:23995 (R:US)
MANIPULATORS
Maintenance
Maintenance glove box for sealed master-slave manipulators, 8:24131 (J:US)
MANNOMUSTINE
See ALKYLATING AGENTS
MANPOWER
Efficiency
Overview of boom towns and construction efficiency interactions, 8:23697 (R:US)
MANUFACTURED BUILDINGS
See PREFABRICATED BUILDINGS
MANUFACTURING FACILITIES
See INDUSTRIAL PLANTS
MANURES
Anaerobic Digestion
Refeeding biogas digester solids, 8:23289 (J:US)
MARGINAL-COST PRICING
Economic Impact
Marginal-cost pricing for gas distribution utilities: further analyses and models, 8:23065 (R:US)
MARICULTURE
See AQUACULTURE

MARINE VEHICLE ACCIDENTS
See ACCIDENTS
MARKET
Econometrics
Modeling international steam-coal trade, 8:23007 (R:US)
MARKET SHARES
See MARKET
MASS FORMULAE
Prediction of mass excess, β-decay energy and neutron separation energy from the atomic mass formula with empirical shell terms, 8:24643 (R:JP)
MASS SPECTROMETERS
Design
Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R:US)
Performance
Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R:US)
MASS SPECTROSCOPY
Ion Sources
Conditioning of ion sources for mass spectrometry of plasmas, 8:24769 (R:US)
MASSACHUSETTS
Radioactive Waste Disposal
Massachusetts low-level radioactive-waste-management survey. National Low-Level Radioactive Waste Management Program, 8:23122 (R:US)
Radioactive Waste Management
Massachusetts low-level radioactive-waste-management survey. National Low-Level Radioactive Waste Management Program, 8:23122 (R:US)
MASSACHUSETTS INSTITUTE OF TECHNOLOGY ALC
See ALCATOR DEVICE
MASURIUM
See TECHNETIUM
MATERIALS (ANTIFERROMAGNETIC)
See ANTIFERROMAGNETIC MATERIALS
MATERIALS (COMPOSITE)
See COMPOSITE MATERIALS
MATERIALS (DIELECTRIC)
See DIELECTRIC MATERIALS
MATERIALS (FERRIMAGNETIC)
See FERRIMAGNETIC MATERIALS
MATERIALS (FERROMAGNETIC)
See FERROMAGNETIC MATERIALS
MATERIALS HANDLING EQUIPMENT
See also HAULAGE EQUIPMENT
REMOTE HANDLING EQUIPMENT
Design
Cable-positioning fixtures. Final report, 8:24101 (R:US)
MATERIALS (MAGNETIC)
See MAGNETIC MATERIALS
MATERIALS (POROUS)
See POROUS MATERIALS
MATERIALS (SHIELDING)
See SHIELDING MATERIALS
MATERIALS TESTING REACTORS
For testing properties of materials or equipment in a radioactive environment.
Fuel Elements
Active neutron coincidence counting for the assay of MTR fuel elements, 8:23193 (R:US)
MATERIALS WORKING
Covers metal and non-metal working.
Energy Consumption
Energy involved in construction materials and procedures, 8:23844 (R:US)
MATHEMATICS
See also TIME-SERIES ANALYSIS
Computer Codes
SLATEC1.0; mathematical subroutine library (CRAY1;CDC CYBER175 (designed to be machine-independent); FORTRAN), 8:25248 (R:US)
MAXWELL EQUATIONS
Oscillation Modes
Focus waves modes in homogeneous Maxwell's equations: Transverse electric mode, 8:24757 (J:US)
MC GUIRE-1 REACTOR
Reactor Licensing
Safety-evaluation report related to operation of McGuire Nuclear Station, Units 1 and 2. Docket Nos. 50-369 and 50-370, 8:23621 (R:US)
Technical specifications: McGuire Nuclear Station, Unit Nos. 1 and 2. Docket Nos. 50-369 and 50-370, 8:23529 (R:US)
Reactor Safety
Safety-evaluation report related to operation of McGuire Nuclear Station, Units 1 and 2. Docket Nos. 50-369 and 50-370, 8:23621 (R:US)
Specifications
Technical specifications: McGuire Nuclear Station, Unit Nos. 1 and 2. Docket Nos. 50-369 and 50-370, 8:23529 (R:US)
MC GUIRE-2 REACTOR
Reactor Licensing
Safety-evaluation report related to operation of McGuire Nuclear Station, Units 1 and 2. Docket Nos. 50-369 and 50-370, 8:23621 (R:US)
Technical specifications: McGuire Nuclear Station, Unit Nos. 1 and 2. Docket Nos. 50-369 and 50-370, 8:23529 (R:US)
Reactor Safety
Safety-evaluation report related to operation of McGuire Nuclear Station, Units 1 and 2. Docket Nos. 50-369 and 50-370, 8:23621 (R:US)
Specifications
Technical specifications: McGuire Nuclear Station, Unit Nos. 1 and 2. Docket Nos. 50-369 and 50-370, 8:23529 (R:US)
MEASURING INSTRUMENTS
Use of a more specific term is recommended.
See also CALORIMETERS
INTERFEROMETERS
LEVEL INDICATORS
NUCLEAR REACTION ANALYZERS
VISCOSIMETERS
Design
TFTR structural instrumentation, 8:25190 (J:US)
MECHANICAL STRUCTURES
See also BELLOWS
INTAKE STRUCTURES
SUPPORTS
Stress Analysis
CREEP-PLAST2; 2-dimensional inelastic structural analysis (IBM360,370; FORTRAN IV (95%) and BAL (5%)), 8:24090 (R:US)
Stresses
TFTR structural instrumentation, 8:25190 (J:US)
MEDICAL PERSONNEL
See also RADIOLOGICAL PERSONNEL
Radiation Protection
An overview of dental radiology: a primer on dental radiology, 8:24390 (R:US)
MEDITERRANEAN SEA
Seismicity
Observation of several large earthquakes with an eastern epicenter. The macroseismic region in Italy of the 1903 Greek earthquake, 8:24488 (R:IT:IT)
MEETINGS
CONF; conference attendee & speaker data file (CDC6600; COBOL 4.5.), 8:25254 (R:US)
MELANOCYTES
See ANIMAL CELLS
MELTDOWN
Experimental investigations of long-term interactions of molten UO_2 with MgO and concrete at Argonne National Laboratory (LMFBR), 8:23595 (R:US)
After-Heat Removal
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium (LMFBR), 8:23596 (R:US)
Dryout
Effect of particle stratification on debris-bed dryout (LMFBR), 8:23598 (R:US)
Heat Transfer
Effect of particle stratification on debris-bed dryout (LMFBR), 8:23598 (R:US)

Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium (LMFBR), 8:23596 (R:US)
Interaction and penetration of heated UO_2 with limestone concrete (LMFBR), 8:23597 (R:US)
Hydraulics
Effect of particle stratification on debris-bed dryout (LMFBR), 8:23598 (R:US)
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium (LMFBR), 8:23596 (R:US)
Test Facilities
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium (LMFBR), 8:23596 (R:US)
Thermal Stresses
Interaction and penetration of heated UO_2 with limestone concrete (LMFBR), 8:23597 (R:US)

MELTING
Molecular Models
Molecular-dynamics study of 2-D melting: long-range potentials, 8:24520 (R:US)

MEMBRANE TRANSPORT
Metabolism
Regulation of transport systems in cultured mammalian cells, 8:24352 (RA:US)

MEN
Sensitivity
Serum copper, follicular stimulating hormone, luteinizing hormone, prolactin, spermatic count, viability, progression and seminal zinc correlations in a human (male) infertility study, 8:24472 (J:US)

MERC PROCESS
Waste Water
Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R:US)

MERCURY
Biological Accumulation
Epidemiologic investigation of the mercury excretion in the urine of children living in an area of industrial concentration (Western Ruhr District), 8:24410 (R:DE:In German)
Ecological Concentration
Variability of mercury concentrations of midcontinent soils, USA; baseline data for a coal-fired power plant, 8:24259 (J:US)
Mass Transfer
Mass transfer in a bubble-agitated liquid-liquid system, 8:24139 (J:US)
Removal
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)

MERCURY 203
Isotope Applications
Some factors influencing liver metallothionein levels in rats and mice, 8:24323 (J:US)

MERCURY CHLORIDES
Genetic Effects
In vivo cytogenetic effect of some salts of the heavy metals cadmium, chromium, mercury, and platinum in assays of micronuclei and sister chromatid exchange, 8:24411 (R:DE:In German)

MESH GENERATION
Computer Codes
ZONE; 2-dimensional finite element mesh generator (CDC7600; FORTRAN), 8:25235 (R:US)

MESON FACTORIES
See also LAMPF II SYNCHROTRON
LAMPF LINAC
Experiment Planning
Grand unified particle physics and a high-intensity intermediate energy machine, 8:24608 (RA:US)

MESOSPHERE
Computerized Simulation
Computer model of chemistry and dynamics of the mesosphere, thermosphere, and ionosphere, 8:24508 (R:US)

MESSENGER-RNA
Biochemistry
mRNA processing in yeast, 8:24312 (RA:US)

METAL BUILDINGS
See PREFABRICATED BUILDINGS

METAL INDUSTRY
Noise Pollution
Parameters influencing noise emission during hot-saw and cold-saw operations and noise reduction measures, 8:24478 (R:DE:In German)
Recycling
Steel-mill-residue recycling processes: an energy and economic analysis. Project final report, 8:23857 (R:US)

METALLOTHIONEIN
Biochemistry
Some factors influencing liver metallothionein levels in rats and mice, 8:24323 (J:US)
Physiology
Some factors influencing liver metallothionein levels in rats and mice, 8:24323 (J:US)

METALS
See also ACTINIDES
ALKALI METALS
ALUMINIUM
CADMIUM
GERMANIUM
LEAD
LIQUID METALS
MERCURY
RARE EARTHS
THALLIUM
TIN
TRANSITION ELEMENTS
ZINC
Absorption Spectroscopy
Trace element and polycyclic aromatic hydrocarbon levels in sediment cores from Sagamore and Woods Lakes, 8:24288 (RA:US)
Charge Exchange
Charge transfer and the effective Coulomb interaction at metal surfaces, 8:24743 (J:US)
Corrosion
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Coulomb Field
Charge transfer and the effective Coulomb interaction at metal surfaces, 8:24743 (J:US)
Creep
Crack and cavity nucleation at interfaces during creep, 8:23938 (R:US)
DEsign for elevated temperature environmetns: some current problems and concerns, 8:23924 (RA:US)
Crystal Defects
Positron prevacancy effects in pure annealed metals, 8:23893 (R:US)
Defects
Characterization of defects in metals by positron-annihilation spectroscopy, 8:23953 (R:US)
Ecological Concentration
Trace element and polycyclic aromatic hydrocarbon levels in sediment cores from Sagamore and Woods Lakes, 8:24288 (RA:US)
Electron-Positron Collisions
Positron-annihilation characteristics in real solids including many-body enhancement effects, 8:24721 (R:US)
Fatigue
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Grain Boundaries
Analysis of diffraction from [001] twist boundaries in cubic metals, 8:23951 (R:US)
Health Hazards
Problems associated with heavy metals in drinking water, 8:24463 (J:US)
Kapitza Resistance
Kapitza thermal boundary resistance between two solids, 8:24746 (BA:US)

Meetings
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Phase Studies
Coupled stress-concentration spinodals, 8:23930 (RA:US)
Physical Radiation Effects
Environmental degradation of engineering materials in aggressive environments, 8:23895 (R:US)
Quantitative Chemical Analysis
X-ray fluorescence/X-ray energy analysis as a trace element tool, 8:24324 (J:US)
Radiation Effects
Radiation effects in metallic alloys, 8:23918 (RA:US)
Self-Diffusion
Atomic defects and diffusion in metals, 8:23936 (R:US)
Stresses
Coupled stress-concentration spinodals, 8:23930 (RA:US)
Surface Coating
Structure of metallic coatings for impurity control in MACROTOR, 8:24882 (J:NL)

METEOROLOGY
DOECTZDATA; California sixteen-zone weather data (IBM360), 8:25223 (R:US)

METER WAVE RADIATION
See RADIOWAVE RADIATION

METHANATION
Catalysis
Design and modeling of low-pressure-drop methanation reactors, 8:23218 (R:US)
Catalysts
Pilot-plant study of an adiabatic parallel-plate methanation reactor, 8:23220 (R:US)
Transmission and backscatter Moessbauer spectroscopy of zeolite Fe (and Fe-Co) synfuel catalysts, 8:24057 (R:US)
Chemical Reaction Yield
Pilot-plant study of an adiabatic parallel-plate methanation reactor, 8:23220 (R:US)
Chemical Reactors
Design and modeling of low-pressure-drop methanation reactors, 8:23218 (R:US)
Pilot-plant study of an adiabatic parallel-plate methanation reactor, 8:23220 (R:US)

METHANE
Air Pollution Monitors
Development of a methane measuring equipment for several measuring points, 8:23008 (R:DE:In German)
Gas Flow
Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries (FRG), 8:22977 (R:PL)
Production
Electron assisted methane production on carbon surfaces, 8:25163 (J:US)
Energy from marine biomass: methane production by mariculture on land. Final report, 8:23272 (R:US)
Family and community biogas plants in rural India and China, 8:23222 (R:US)
Recovery
Degasification of longwalls. Phase 1: annex to report no. 2 on the technology of degasification of mines in Poland and other European countries (FRG), 8:22977 (R:PL)
Landfill gas recovery in the USA, 8:23873 (R:US)
Unconventional gas resources (Eastern Gas Shales, Western Gas Sands, Coalbed Methane, Methane from Geopressured Systems), 8:23075 (R:US)
Synthesis
Pilot-plant study of an adiabatic parallel-plate methanation reactor, 8:23220 (R:US)
Yields
Computer optimization of landfill-cover design, 8:23871 (R:US)

METHANOL
Market
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume III. Market analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23230 (R:US)
Marketing Research
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume III. Market analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23230 (R:US)
Operating Cost
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Prices
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume III. Market analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23230 (R:US)
Production
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23235 (R:US)
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume V. Economic and financial analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23231 (R:US)
Purification
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Synthesis
Transportation fuels from indirect coal liquefaction (US DOE; reviews and considers work in other countries), 8:22918 (R:US)
Thermodynamic Properties
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R:US)

METHANOL FUELS
Pure methanol, methanol-water mixtures, or methanol with additives; for methanol-gasoline mixtures, use GASOHOL.
Combustion
A brief summary of the technical feasibility, emissions, and fuel economy of pure methanol engines, 8:23237 (R:US)
Feasibility Studies
A brief summary of the technical feasibility, emissions, and fuel economy of pure methanol engines, 8:23237 (R:US)
Annotated review of the technological state-of-the-art of ethyl and methyl alcohol-based fuels and determination of the economic feasibility of commercial-scale production of such fuels, 8:23238 (R:US)
Production
Annotated review of the technological state-of-the-art of ethyl and methyl alcohol-based fuels and determination of the economic feasibility of commercial-scale production of such fuels, 8:23238 (R:US)

METHANOL PLANTS
By-Products
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume III. Market analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23230 (R:US)
Capitalized Cost
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)

Design
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant. Final report (W.R. Grace project coal-gasification-methanol-gasoline project at Baskett, KY), 8:22922 (R:US)
Economic Analysis
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume V. Economic and financial analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23231 (R:US)
Engineering
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant. Final report (W.R. Grace project coal-gasification-methanol-gasoline project at Baskett, KY), 8:22922 (R:US)
Environmental Effects
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23233 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23235 (R:US)
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)
Equipment
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Feasibility Studies
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23234 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume III. Market analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23230 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23235 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VIII. Coal quality analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23236 (R:US)
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume V. Economic and financial analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23231 (R:US)
Legal Aspects
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)
Operating Cost
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23229 (R:US)
Permit Applications
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)
Risk Assessment
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume V. Economic and financial analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23231 (R:US)
Site Selection
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23233 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23234 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23235 (R:US)
Socio-Economic Factors
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23233 (R:US)
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23234 (R:US)
Taxes
Dunn-Nokota methanol project, Dunn County, North Dakota. Volume VI. Tax, legal and regulatory analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23232 (R:US)
Water Supply
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VII. Environmental and socioeconomic assessments (Proposed methanol project near Dunn Center, North Dakota), 8:23235 (R:US)

METHYL ALCOHOL
See METHANOL

METHYL IODIDE
Adsorption
Iodine-fixation studies at the Pacific Northwest Laboratory, 8:23165 (R:US)

METHYL METHANESULFONATE
Genetic Effects
DNA damage in mammalian sperm assayed by alkaline elution, 8:24434 (RA:US)
Induction of chromosome aberrations, sister chromatid exchanges and specific locus mutations by radiation and chemicals, and the application of the studies to population monitoring and risk estimation, 8:24376 (RA:US)

METHYL NITROSOUREA
Biological Effects
Effect of ethylnitrosourea, methylnitrosourea, and hydroxyethylnitrosourea on the testis, 8:24440 (RA:US)
Genetic Effects
Methylnitrosourea-induced specific-locus mutations in the mouse, 8:24425 (RA:US)
Mutagen Screening
Investigation of the supermutagen ENU and other substances in the Mouse Spot Test, 8:24427 (RA:US)
Mutagenesis
Comparative mutagenesis, 8:24415 (RA:US)

METHYL PHENOLS
See CRESOLS

METHYL VIOLOGEN
See BIPYRIDINES

METHYLBENZENE
See TOLUENE

METHYLENE RADICALS
Fluorescence
Laser-induced fluorescence of trapped molecular ions: the $CH^+ A^1\pi - X^1\Sigma^+$ system, 8:24565 (J:GB)
METHYL-FUEL
See ALCOHOLS
METHANOL
METHYLIDENE RADICALS
See METHYLENE RADICALS
METROPOLITAN AREAS
See URBAN AREAS
MEXICO
Volcanoes
Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences, 8:24491 (R:US)
MFTF DEVICES
Prior to October 1977, MX DEVICES was used to index this concept.
Configuration Control
Device configuration management system, 8:25178 (J:US)
Control Systems
Device configuration management system, 8:25178 (J:US)
Local controls and instrumentation for MFTF, 8:24921 (J:US)
Tools and methods for the implementing the control system on the mirror fusion test facility, 8:24953 (J:US)
ECR Heating
Quasi-optical ECRH beam system for MFTF-B, 8:24776 (R:US)
Electrical Equipment
Mirror fusion test facility electrical systems, status and plans, 8:25217 (J:US)
Ion Sources
Industrialization and production of neutral beam ion sources for MFTF, 8:25114 (J:US)
Neutral Beam Sources
Industrialization and production of neutral beam ion sources for MFTF, 8:25114 (J:US)
Safety procedures for the MFTF sustaining neutral beam power supply, 8:25072 (J:US)
Power Supplies
CAMAC-based interlock system for power supply hardware protection on MFTF, 8:25188 (J:US)
Pressure Vessels
Analysis of ambient vibrational motion of MFTF-A vessel/magnet structure, 8:24839 (R:US)
Reactor Safety
Safety procedures for the MFTF sustaining neutral beam power supply, 8:25072 (J:US)
MHD CHANNELS
Design
Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R:US)
Electrical Faults
Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R:US)
Flow Models
Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R:US)
MHD GENERATOR CDIF
Coal-fired Component Development and Integration Facility at Butte, Montana.
Combustors
Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R:US)
MHD Channels
Research and development studies for MHD/coal power flow-train components. Technical progress report, 1 September 1981-1 September 1982, 8:23775 (R:US)
MHD GENERATOR CFFF
Coal Fired Flow Facility for MHD generator component testing at Tullahoma, Tenn.
Superconducting Magnets
Fabrication experiences of the Coal-Fired Flow Facility superconducting dipole magnet, 8:23777 (J:US)
Measurements of mechanical properties of superstructures materials for the CFFF superconducting MHD magnet, 8:23778 (J:US)
Safety consequences of shorted turns in a cryostable superconducting magnet, 8:23780 (J:US)
MHD GENERATOR U-25
Natural-gas fired MHD pilot plant in the USSR.
Performance
U-25B MHD-generator performance, 8:23768 (R:US)
Systems Analysis
U-25B MHD-generator performance, 8:23768 (R:US)
MHD GENERATORS
See also COAL-FIRED MHD GENERATORS
LIQUID-METAL MHD GENERATORS
MHD GENERATOR U-25
PULSED MHD GENERATORS
Air Pollution Abatement
Effect of secondary combustion on nitric oxide concentrations in a MHD combustion gas, 8:23767 (R:US)
Exhaust Gases
Effect of secondary combustion on nitric oxide concentrations in a MHD combustion gas, 8:23767 (R:US)
Superconducting Magnets
United States Superconducting MHD Magnet Technology Development Program, 8:23779 (J:US)
MHD POWER PLANTS
Design
Application of polyalgorithmic optimization to MHD power plant design, 8:23771 (R:US)
Feasibility Studies
Performance advantages of a gas-stream MHD retrofit, 8:23772 (R:US)
Systems Analysis
Application of polyalgorithmic optimization to MHD power plant design, 8:23771 (R:US)
Off-design study of an open cycle MHD power plant with oxygen enrichment, 8:23769 (R:US)
MICE
Delayed Radiation Effects
Carcinogenesis following prenatal exposure to radiation, 8:24395 (J:DE)
Gene Mutations
Analysis of the albino-locus region of the mouse: characterization of 34 deficiencies, 8:24333 (RA:US)
Genetic study on mutants that will provide model systems for skin carcinogenesis, 8:24334 (RA:US)
Qualitative analysis of mouse specific-locus mutations, 8:24332 (RA:US)
MICELLAR-POLYMER FLOODING
See MICROEMULSION FLOODING
MICHIGAN
Black Shales
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R:US)
Natural Gas Deposits
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R:US)
MICROANALYSIS
X-Ray Emission Analysis
Influence of detector geometry on AEM-based x-ray microanalysis. I. Theoretical, 8:24046 (R:US)
MICROBIAL ENHANCED OIL RECOVERY
See MICROBIAL EOR
MICROBIAL EOR
Research Programs
Applied genetic engineering has a place in petroleum production, 8:23022 (J:US)

MICROBIAL PROCESSES
See ANAEROBIC DIGESTION
BIOCONVERSION
MICROEMULSION FLOODING
Additives
Phase behaviour of alkylxylenesulphonate/oil/brine systems, 8:23023 (BA:FR)
Testing
DOE, Gary testing tertiary polymer technique, 8:23026 (J:US)
MICRO-SCALE HYDROELECTRIC POWER PLANTS
Pumps
Economics of Cherepnov water lifter for low-head hydropower, 8:23244 (R:US)
Theoretical and experimental investigation of the Cherepnov water lifter, 8:23243 (R:US)
MICROSPHERES
Fabrication
Mixed uranium dicarbide and uranium dioxide microspheres and process of making same, 8:23107 (P:US)
MICROWAVE AMPLIFIERS
Design
Gyrotron - an ECH system component, 8:25121 (J:US)
Performance
Conception, implementation and performance of the high power, high frequency amplifier for icrh at Fontenay-aux-Roses, France, 8:24925 (J:US)
Research Programs
60-GHz-gyrotron development program. Quarterly report No. 13, July-September 1982, 8:24836 (R:US)
Overview of DOE gyrotron development program, 8:25120 (J:US)
Recent progress in fusion gyrotron development, 8:25122 (J:US)
MICROWAVE EQUIPMENT
See also MICROWAVE AMPLIFIERS
Lower hybrid rf monitoring system for PLT, 8:24954 (J:US)
MIGRATION (RADIONUCLIDE)
See RADIONUCLIDE MIGRATION
MILITARY FACILITIES
Resource Recovery Facilities
Resource recovery technology application document. Final report, 8:23870 (R:US)
Waste Management
Resource recovery technology application document. Final report, 8:23870 (R:US)
MILITARY PERSONNEL
Radiation Doses
Analysis of radiation exposure for troop observers, Exercise Desert Rock VI, Operation Teapot. Final report 1 Mar-15 Jul 80, 8:24359 (R:US)
Operation TUMBLER-SNAPPER 1952. Technical report, 8:24361 (R:US)
MILL TAILINGS
Decommissioning
Final environmental impact statement for remedial action standards for inactive uranium processing sites (40 CFR 192) Volume I. Final report, 8:23186 (R:US)
Decontamination
Final environmental impact statement for remedial action standards for inactive uranium processing sites (40 CFR 192) Volume I. Final report, 8:23186 (R:US)
Environmental Impact Statements
Final environmental impact statement for remedial action standards for inactive uranium processing sites (40 CFR 192) Volume I. Final report, 8:23186 (R:US)
Liners
Performance of asphalt and clay liners as a uranium mill tailings leachate barrier, 8:23164 (R:US)
PH Value
Evaluation of selected neutralizing agents for the treatment of uranium tailings leachates. Laboratory progress report, 8:23152 (R:US)
Radioactivity
Basic technique and models for determining exposure rates over uranium-bearing soils. Final report, 8:23185 (R:US)
Radiochemistry
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)
Radionuclide Migration
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)
Stabilization
Design surface covers: an approach to long-term waste site stabilization, 8:23172 (R:US)
MILLSTONE-1 REACTOR
Electrical Equipment
Technical evaluation report on the adequacy of station electric-distribution-system voltages for the Millstone Nuclear Power Station, Units 1 and 2. Docket Nos. 50-245, 50-336, 8:23467 (R:US)
Power Supplies
Technical evaluation report on the adequacy of station electric-distribution-system voltages for the Millstone Nuclear Power Station, Units 1 and 2. Docket Nos. 50-245, 50-336, 8:23467 (R:US)
MILLSTONE-2 REACTOR
Electrical Equipment
Technical evaluation report on the adequacy of station electric-distribution-system voltages for the Millstone Nuclear Power Station, Units 1 and 2. Docket Nos. 50-245, 50-336, 8:23467 (R:US)
Power Supplies
Technical evaluation report on the adequacy of station electric-distribution-system voltages for the Millstone Nuclear Power Station, Units 1 and 2. Docket Nos. 50-245, 50-336, 8:23467 (R:US)
MINE HAULAGE
Power Systems
Development of a dc current limiting interrupting system for mines. Open file report Jun 79-Sep 81, 8:24109 (R:US)
MINE ROADWAYS
Supports
Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls, 8:22978 (R:US)
MINE-MOUTH GENERATING PLANTS
See COAL MINES
FOSSIL-FUEL POWER PLANTS
MINERALS
See also ZEOLITES
Catalytic Effects
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Sorptive Properties
Actinide sorption on rock minerals, 8:23146 (RA:DE)
X-Ray Diffraction
Further development of automatic measuring equipment for X-ray mineral analysis with computer, 8:24496 (R:DE:In German)
MINERS
See also COAL MINERS
Health Hazards
Review of uranium miners study and statements of outstanding problems. Technical report, 8:24389 (R:US)
MINES
See also COAL MINES
URANIUM MINES
DC Systems
Development of a dc current limiting interrupting system for mines. Open file report Jun 79-Sep 81, 8:24109 (R:US)
MINING
See also COAL MINING
OIL SAND MINING
OIL SHALE MINING
SOLUTION MINING
SURFACE MINING
UNDERGROUND MINING
Environmental Effects
Cadmium and lead contaminated soils in some British metal mining areas, 8:24260 (J:US)
Radioactivity in groundwater associated with uranium and phosphate mining and processing, 8:24298 (J:US)

MINING EQUIPMENT
Alarm Systems
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)
Data Acquisition Systems
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)
Duty-cycle investigations of continuous miners. Volume II. Instrument manual, 8:22975 (R:US)
Display Devices
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)
Duty-cycle investigations of continuous miners. Volume II. Instrument manual, 8:22975 (R:US)
Measuring Instruments
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)
Microprocessors
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)
MINI-SERVE STATIONS
See GASOLINE SERVICE STATIONS
MIRROR FUSION TEST FACILITY
See MFTF DEVICES
MIRRORS
Production
Method for producing highly reflective metal surfaces, 8:23976 (P:US)
Replicas
Method for producing highly reflective metal surfaces, 8:23976 (P:US)
Surface Properties
Method for producing highly reflective metal surfaces, 8:23976 (P:US)
MISGURNUS
See FISHES
MIT BATES LINAC
Bates Electron Linear Accelerator Facility at MIT.
Electron Sources
Polarized electron source for parity experiment at Bates, 8:24176 (R:US)
MITOCHONDRIA
Sensitivity
Effect of dietary manganese on the respiratory activity of liver mitochondria, 8:24466 (J:US)
MMS
See METHYL METHANESULFONATE
MNU
See METHYL NITROSOUREA
MOBIL M-GASOLINE PROCESS
Catalysts
Transportation fuels from indirect coal liquefaction (US DOE; reviews and considers work in other countries), 8:22918 (R:US)
Temperature Control
Transportation fuels from indirect coal liquefaction (US DOE; reviews and considers work in other countries), 8:22918 (R:US)
MODELS (NUCLEAR)
See NUCLEAR MODELS
MOISTURE
Effects of moisture on radon emanation including the effects on diffusion. Open file report oct 79-Nov 81, 8:23097 (R:US)
MOLDING MATERIALS
Evaluation
Diallyl phthalate prepolymer characterization and testing in fiberglass filled molding compounds, 8:24019 (R:US)
MOLDS
See FUNGI
MOLECULAR FLUORESCENCE SPECTROSCOPY
See FLUORESCENCE SPECTROSCOPY
MOLECULAR IONS
Coordinate the above descriptor with a descriptor for the specific ion.
See also HYDROGEN IONS 2 PLUS
HYDROGEN IONS 3 PLUS
Ion Spectroscopy
Using an electrostatic accelerator to determine the stereochemical structures of molecular ions, 8:24516 (R:US)
Molecular Structure
Using an electrostatic accelerator to determine the stereochemical structures of molecular ions, 8:24516 (R:US)
Photoelectron Spectroscopy
Laser photoelectron spectroscopy of ions. Progress report, August 1, 1982-July 31, 1983, 8:24527 (R:US)
MOLECULAR MODELS
Melting
Molecular-dynamics study of 2-D melting: long-range potentials, 8:24520 (R:US)
MOLECULAR ORBITAL MODEL
See MOLECULES
MOLECULES
See also POLYATOMIC MOLECULES
Affinity
Electron affinities of atoms, molecules, and radicals, 8:24525 (R:US)
Interaction of slow electrons with high-pressure gases ('Quasi-liquids'): synthesis of our knowledge on slow electron-molecule interactions. Progress report, 8:24526 (R:US)
Dynamics
Intramolecular dynamics in the quasiperiodic and stochastic regimes, 8:24561 (BA:US)
Electron Attachment
Interaction of slow electrons with high-pressure gases ('Quasi-liquids'): synthesis of our knowledge on slow electron-molecule interactions. Progress report, 8:24526 (R:US)
Energy Levels
Electron affinities of atoms, molecules, and radicals, 8:24525 (R:US)
Excited States
Electronic excited state transport among molecules distributed randomly in a finite volume, 8:24551 (J:US)
MOLTEN CARBONATE FUEL CELLS
Prior to June 1980 this information was indexed with the descriptors HIGH-TEMPERATURE FUEL CELLS + MOLTEN SALTS + CARBONATES.
Fuel Systems
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program, 8:23782 (R:US)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program, 8:23781 (R:US)
Materials
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Materials Testing
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
MOLTEN SALT COOLANTS
See MOLTEN SALTS
MOLTEN SALTS
Thermodynamics
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)
MOLYBDENUM
Catalytic Effects
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R:US)
Coatings
Thermal fatigue testing of low-Z coatings on molybdenum and Inconel 625, 8:24907 (J:NL)
Fatigue
Fatigue data of molybdenum, 8:25164 (J:US)
MOLYBDENUM 100 TARGET
Argon 40 Reactions
Charge equilibration in the deep-inelastic reactions $^{40}Ar + {}^{100}Mo$ and $^{36}Ar + {}^{92}Mo$, 8:24675 (RA:DE:In German)
MOLYBDENUM 92 TARGET
Argon 36 Reactions
Charge equilibration in the deep-inelastic reactions $^{40}Ar + {}^{100}Mo$ and $^{36}Ar + {}^{92}Mo$, 8:24675 (RA:DE:In German)

Krypton 86 Reactions
Role of deformation and shell effects in deep inelastic collisions of $^{86}Kr + {}^{86}Sr, {}^{90}Zr, {}^{92}Mo$ at energies close to the Coulomb barrier, 8:24667 (RA:DE:In German, English)

MOLYBDENUM COMPOUNDS
See also MOLYBDENUM OXIDES
MOLYBDENUM SULFIDES
Crystal Structure
Neutron powder diffraction study of the lithium insertion compound $LiMoO_2$ from 4 to 440°k, 8:24044 (J:GB)
Magnetic Susceptibility
Neutron powder diffraction study of the lithium insertion compound $LiMoO_2$ from 4 to 440°k, 8:24044 (J:GB)

MOLYBDENUM OXIDES
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)

MOLYBDENUM SULFIDES
Superconductivity
Hydrostatic pressure effects on the superconductivity of La/sub 1.2-x/Eu/sub x/MO_6S_8 pseudoternary compounds, 8:24041 (J:US)
Transition Temperature
Hydrostatic pressure effects on the superconductivity of La/sub 1.2-x/Eu/sub x/MO_6S_8 pseudoternary compounds, 8:24041 (J:US)

MONITORING (RADIATION)
See RADIATION MONITORING

MONITORS (AIR POLLUTION)
See AIR POLLUTION MONITORS

MONITORS (REACTOR)
See REACTOR CONTROL SYSTEMS

MONTANA
Coal Deposits
Geologic map and coal resources of the Thompson Creek area, Big Horn County, Montana, 8:22966 (R:US)
Geothermal Resources
Geology and geothermal resources of the eastern Centennial Valley, 8:23363 (J:US)
Maps
Geologic map and coal resources of the Thompson Creek area, Big Horn County, Montana, 8:22966 (R:US)
Oil Fields
DOE, Gary testing tertiary polymer technique, 8:23026 (J:US)
Oil Wells
Results of the Bell Creek Unit "A" micellar/polymer pilot, 8:23024 (BA:FR)

MORDENITE
Recycling
Iodine-fixation studies at the Pacific Northwest Laboratory (Silver mordenite), 8:23165 (R:US)
Sorptive Properties
Iodine-fixation studies at the Pacific Northwest Laboratory (Silver mordenite), 8:23165 (R:US)

MULTIGROUP THEORY
Computer Codes
TIMEX; 1-dimensional time-dependent multigroups discrete ordinates (IBM360,370;CDC7600; FORTRAN IV), 8:24717 (R:US)

MULTIPLIER TUBES
See ELECTRON MULTIPLIERS

MULTIVARIATE ANALYSIS
Computer Codes
ANOVA; three factor analysis of variance (CDC6600; FORTRAN IV), 8:25247 (R:US)
PCTEST; principal component test for outliers (IBM360,370; FORTRAN IV), 8:25237 (R:US)
SOERP; second-order error propagation code (IBM360,370;CDC7600; FORTRAN IV), 8:25234 (R:US)
SPEKEN; Pearson, Spearman & Kendall correlation (IBM360,370; FORTRAN IV), 8:25241 (R:US)

MUNICIPAL BUILDINGS
See PUBLIC BUILDINGS

MUNICIPAL WASTES
Anaerobic Digestion
Energy recovery from the effluent of plants anaerobically digesting urban solid waste, 8:23876 (R:US)
Review and evaluation of a bioconversion-process demonstration plant and its related technologies, 8:23874 (R:US)
Cocombustion
Seminar proceedings: municipal solid waste as a utility fuel, 8:23877 (R:US)
Environmental Impacts
Environmental and health aspects of waste-to-energy systems, 8:24402 (R:US)
Waste Management
Fuel of MSW, 8:23217 (R:DE:In German)
Waste Processing
Fuel of MSW, 8:23217 (R:DE:In German)

MUON NUMBER
Muon number violating kaon decays, 8:24607 (RA:US)

MUON PAIRS
Pair Production
Production mechanisms of high mass muon pairs. Technical report number 117, 8:24576 (R:US)

MUON REACTIONS
Meetings
Proceedings of the workshop on muon science and facilities at Los Alamos, 8:24545 (R:US)

MUONIUM
Chemical Reaction Kinetics
Quasiclassical trajectory (and variational transition state theory) study of the rates and temperature-dependent activation energies of the reactions $Mu+H_2$ (completely thermal) and H, D, and $Mu+H_2$ ($v = 0, j = 2$), 8:24079 (J:US)

MUONS
See also MUONS PLUS
Leptonic Decay
Rare decays of pions & muons: a review, 8:24581 (RA:US)
Radiative Decay
Rare decays of pions & muons: a review, 8:24581 (RA:US)

MUONS PLUS
Leptonic Decay
Normal muon decay and the Los Alamos TPC project, 8:24598 (RA:US)
Search for muon number violation at LAMPF, 8:24599 (RA:US)
Radiative Decay
Search for muon number violation at LAMPF, 8:24599 (RA:US)

MUTAGEN SCREENING
Comparative mutagenesis, 8:24415 (RA:US)
Microbial mutagenesis and cell division, 8:24380 (RA:US)
Role of whole-mammal mutagenicity tests in predicting genetic risk, 8:24431 (RA:US)
Evaluation
Mouse Spot Test: evaluation of its performance as a prescreen, 8:24426 (RA:US)

MUTAGENESIS
Genetic Effects
Mechanisms of mutagenesis: analysis through the use of alcohol dehydrogenase in Drosophila. Contract summary, May 1978-October 1980, 8:24408 (R:US)
Research Programs
Mechanisms of mutagenesis: analysis through the use of alcohol dehydrogenase in Drosophila. Contract summary, May 1978-October 1980, 8:24408 (R:US)

MUTAGENS
See also EMS
METHYL METHANESULPONATE
METHYL NITROSOUREA
Bioassay
In vivo cytogenetic effect of some salts of the heavy metals cadmium, chromium, mercury, and platinum in assays of micronuclei and sister chromatid exchange, 8:24411 (R:DE:In German)
Risk Assessment
Dose response modeling for chemical mutagens, 8:24438 (RA:US)

MUTATIONS
See also GENE MUTATIONS
SOMATIC MUTATIONS

Kinetics
Kinetics of mutation and sister-chromatid exchange induction by ethyl methanesulfonate in Chinese hamster ovary cells, 8:24476 (J:NL)
Measuring Methods
Further development of techniques for studying induction of dominant skeletal mutations, 8:24331 (RA:US)

MX DEVICES
See MFTF DEVICES

MYELOID LEUKEMIA
Etiology
Molecular genetics of carcinogenesis, 8:24387 (RA:US)
Leukemogenesis
Radiation immunology (X radiation), 8:24386 (RA:US)
Radioinduction
Molecular genetics of carcinogenesis, 8:24387 (RA:US)

N

NAI DETECTORS
Calibration
Calibration of phoswich detectors for the in vivo measurement of americium, plutonium and uranium: interlaboratory comparison using the Lawrence Livermore calibration, 8:24733 (RA:US)
Preliminary analysis of data obtained from participation in the IAEA human-mock plutonium intercalibration experiment, 8:24367 (RA:US)
Interlaboratory Comparisons
Calibration of phoswich detectors for the in vivo measurement of americium, plutonium and uranium: interlaboratory comparison using the Lawrence Livermore calibration, 8:24733 (RA:US)
Spectral Response
Low-energy, photon-emitting nuclides: reference spectra library, 8:24737 (RA:US)

NAPHTHENES
See CYCLOALKANES

NATIONAL REACTOR TESTING STATION
See IDAHO NATIONAL ENGINEERING LABORATORY

NATURAL ACTIVITY
See NATURAL RADIOACTIVITY

NATURAL GAS
See also LIQUEFIED NATURAL GAS
Monthly energy review, 8:23002 (R:US)
Consumption Rates
Cost and quality of fuels for electric utility plants, 8:23413 (R:US)
Cost and quality of fuels for electric utility plants (November 1982), 8:23414 (R:US)
Energy Demand
Marginal-cost pricing for gas distribution utilities: further analyses and models, 8:23065 (R:US)
Exports
Natural gas monthly, 8:23066 (R:US)
Fuel Consumption
Cost and quality of fuels for electric utility plants (For January 1982), 8:23410 (R:US)
Cost and quality of fuels for electric utility plants (For April 1982), 8:23411 (R:US)
Cost and quality of fuels for electric utility plants (For September 1982), 8:23412 (R:US)
Natural gas monthly, 8:23066 (R:US)
Imports
Natural gas monthly, 8:23066 (R:US)
Marginal-Cost Pricing
Marginal-cost pricing for gas distribution utilities: further analyses and models, 8:23065 (R:US)
Prices
Cost and quality of fuels for electric utility plants (For January 1982), 8:23410 (R:US)
Cost and quality of fuels for electric utility plants (For April 1982), 8:23411 (R:US)
Cost and quality of fuels for electric utility plants (For September 1982), 8:23412 (R:US)
Cost and quality of fuels for electric utility plants, 8:23413 (R:US)
Cost and quality of fuels for electric utility plants (November 1982), 8:23414 (R:US)
Natural gas monthly, 8:23066 (R:US)
Production
Gas deliverability and flow capacity of surveillance gas fields in Texas (1982-2001), 8:23063 (R:US)
Gas supplies of interstate natural gas pipeline companies, 1981, 8:23048 (R:US)
Natural gas monthly, 8:23066 (R:US)
Recovery
Unconventional gas resources (Eastern Gas Shales, Western Gas Sands, Coalbed Methane, Methane from Geopressured Systems), 8:23075 (R:US)
Reserves
Gas supplies of interstate natural gas pipeline companies, 1981, 8:23048 (R:US)
Sales
Natural gas revenues of major energy companies, 1977-1981, 8:23064 (R:US)
Storage
Natural gas monthly, 8:23066 (R:US)
Supply and Demand
EIA symposium on short-term energy forecasting. Summary of the proceedings, 8:23721 (R:US)

NATURAL GAS DEPOSITS
See also NATURAL GAS FIELDS
Acoustic Measurements
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Electrical Properties
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Exploration
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Report to the Fort Belknap Community Council on the work undertaken during the summer, 1979, 8:23014 (R:US)
Explosive Fracturing
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R:US)
Evaluation of stimulation technologies in the Eastern Gas Shales Project, 8:23073 (R:US)
Fractures
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Geochemistry
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Hydraulic Fracturing
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R:US)
Evaluation of stimulation technologies in the Eastern Gas Shales Project, 8:23073 (R:US)
Leases
Improvements needed in the cash management practices of Interior's simultaneous oil and gas leasing program in Wyoming, 8:23724 (R:US)
Lithology
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Organic Matter
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980 (Formation-density wire logs), 8:23062 (R:US)
Permeability
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)

Porosity
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Resource Assessment
Eastern Gas Shales Project: increasing US natural gas reserves from eastern gas-bearing shales, 8:23072 (R:US)
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications, 8:23013 (R:US)
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
Seismic Surveys
Three-dimensional migration of travel time maps, 8:23049 (R:DE:In German)
Stratigraphy
Analysis of the Devonian shales in the Appalachian Basin, 8:23057 (R:US)
Approximation of continuity of lenticular Mesaverde Group sandstone lenses utilizing close-well correlations, Piceance Basin, NW Colorado. SPE 11610, 8:23059 (R:US)
Ultrasonic Testing
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Water Saturation
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Well Logging
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980 (Formation-density wire logs), 8:23062 (R:US)

NATURAL GAS DISTRIBUTION SYSTEMS
Capitalized Cost
Marginal-cost pricing for gas distribution utilities: further analyses and models, 8:23065 (R:US)
Data Acquisition Systems
Use of computers for the documentation of supply lines, 8:23430 (R:DE:In German)
Data Compilation
Gas supplies of interstate natural gas pipeline companies, 1981, 8:23048 (R:US)
Operating Cost
Marginal-cost pricing for gas distribution utilities: further analyses and models, 8:23065 (R:US)

NATURAL GAS FIELDS
Aerial Surveying
Correlation of surficial geologic anomalies with gas production, Cottageville Field, West Virginia, 8:23055 (R:US)
Equipment
Costs and indexes for domestic oil- and gas field equipment and production operations, 1982, 8:23017 (R:US)
Fluid Withdrawal
Gas deliverability and flow capacity of surveillance gas fields in Texas (1982-2001), 8:23063 (R:US)
Resource Depletion
Gas deliverability and flow capacity of surveillance gas fields in Texas (1982-2001), 8:23063 (R:US)
Topography
Correlation of surficial geologic anomalies with gas production, Cottageville Field, West Virginia, 8:23055 (R:US)

NATURAL GAS GATHERING SYSTEMS
See NATURAL GAS DISTRIBUTION SYSTEMS

NATURAL GAS INDUSTRY
Data Compilation
Natural gas monthly, 8:23066 (R:US)
Energy Accounting
Marginal energy cost of goods and services. Final report, 8:23037 (R:US)
Energy Models
Oil and natural gas extraction: a game theoretic approach, 8:23031 (R:US)
Income
Natural gas revenues of major energy companies, 1977-1981, 8:23064 (R:US)

NATURAL GAS WELLS
Electric Logging
Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report, 8:23056 (R:US)
Explosive Fracturing
High-energy gas-fracturing development. Quarterly report, October-December 1982, 8:23077 (R:US)
Flow Models
Modeling of Devonian shale gas reservoirs. Task 16. Mathematical modeling of shale gas production (2D model). Final report, 8:23053 (R:US)
Gamma Logging
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
Production
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R:US)
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
Well Drilling
Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report, 8:23056 (R:US)
Well Spacing
Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report, 8:23056 (R:US)
Well Stimulation
Effectiveness of hydraulic-fracturing treatments in the Devonian Shale, 8:23076 (R:US)
Evaluation of stimulation technologies in the Eastern Gas Shales Project, 8:23073 (R:US)
Project to test for shale gas in Ohio. Final report, 8:23054 (R:US)

NATURAL LIGHTING
See DAYLIGHTING

NATURAL RADIOACTIVITY
For unspecified naturally occurring radioisotopes only; not for BACKGROUND RADIATION.
Radioecological Concentration
Thoughts about revising the radiation regulations in drinking water concerned with natural radioactivity, 8:24353 (J:US)

NAVAL OIL SHALE RESERVES
Evaluation
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R:US)

NAVAL PETROLEUM RESERVE
Evaluation
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R:US)

NEGATONS
See ELECTRONS

NEGATRONS
See ELECTRONS

NEODYMIUM 146 TARGET
Oxygen 16 Reactions
Complete fusion in the system $^{146}Nd + {}^{16}O$ at 10 MeV/N, 8:24687 (RA:DE:In German)

NEODYMIUM IONS
Spin-Lattice Relaxation
Concentration and temperature dependence of the 4f spin relaxation of isolated Nd and Ce ions in simple metals, 8:23968 (RA:DE:In German, English)

NEODYMIUM LASERS
Synchronization
Laser sequencing, synchronization, and safety systems, 8:25150 (J:US)

NEON
Ion-Atom Collisions
Charge distributions of recoil ions, 8:24537 (RA:DE:In German)
Target thickness and density effects for inner shell excitation in near symmetric collision-systems, 8:24544 (RA:DE:In German)
NEON 20 REACTIONS
Breakup Reactions
Dissociation of 15 MeV/nucleon ^{20}Ne in collisions with ^{197}Au: direct reactions leading to particle-emitting states, 8:24693 (RA:DE:In German, English)
Dissociation of ^{20}Ne in collisions with ^{40}Ca at 14.5 MeV/nucleon, 8:24660 (RA:DE:In German, English)
Deep Inelastic Heavy Ion Reactions
Evidence for non-sequential emission of fast α-particles in deep-inelastic ^{20}Ne + ^{197}Au collisions at 14.5 MeV/nucleon, 8:24694 (RA:DE:In German, English)
Elastic Scattering
Excitation of the giant quadrupole resonance in ^{58}Ni by 40 MeV ^{20}Ne, 8:24657 (RA:DE:In German)
Study of inelastic and single-neutron transfer reactions induced by 14.5 MeV/A ^{20}Ne ions on ^{40}Ca, 8:24659 (RA:DE:In German, English)
Heavy Ion Reactions
Incomplete momentum transfer in fusion reactions, 8:24662 (RA:DE:In German)
Measurement of coincidences between evaporation residues and fast light particles, 8:24668 (RA:DE:In German)
Search for 'fast fission' at the system ^{20}Ne + ^{197}Au, 8:24696 (RA:DE:In German, English)
Spin polarization in ^{20}Ne + ^{168}Er collisions at 13.5 MeV/N, 8:24654 (RA:DE:In German)
Study of ^{20}Ne + ^{40}Ca at Esub(lab)/A = 14.5 MeV, 8:24661 (RA:DE:In German, English)
Inclusive Interactions
Balance between light-fragment and fission inclusive cross sections of the ^{20}Ne + ^{197}Au reaction between 7.5 and 20 MeV/nucleon, 8:24653 (RA:DE:In German, English)
Light charged-particle emission from ^{197}Au + ^{20}Ne, 8:24700 (RA:DE:In German, English)
Neutron emission in the reaction ^{165}Ho + ^{20}Ne, 8:24684 (RA:DE:In German, English)
Inelastic Scattering
Dissociation of 15 MeV/nucleon ^{20}Ne in collisions with ^{197}Au: direct reactions leading to particle-emitting states, 8:24693 (RA:DE:In German, English)
Dissociation of ^{20}Ne in collisions with ^{40}Ca at 14.5 MeV/nucleon, 8:24660 (RA:DE:In German, English)
Excitation of the giant quadrupole resonance in ^{58}Ni by 40 MeV ^{20}Ne, 8:24657 (RA:DE:In German)
Study of inelastic and single-neutron transfer reactions induced by 14.5 MeV/A ^{20}Ne ions on ^{40}Ca, 8:24659 (RA:DE:In German, English)
One-Nucleon Transfer Reactions
Dissociation of 15 MeV/nucleon ^{20}Ne in collisions with ^{197}Au: direct reactions leading to particle-emitting states, 8:24693 (RA:DE:In German, English)
Study of inelastic and single-neutron transfer reactions induced by 14.5 MeV/A ^{20}Ne ions on ^{40}Ca, 8:24659 (RA:DE:In German, English)
NEON 22 REACTIONS
One-Nucleon Transfer Reactions
Spectroscopy of neutron-rich nuclei via particle-γ-coincidences with a magnetic spectrograph, 8:24202 (RA:DE:In German)
Two-Nucleon Transfer Reactions
Spectroscopy of neutron-rich nuclei via particle-γ-coincidences with a magnetic spectrograph, 8:24202 (RA:DE:In German)
NEON IONS
Ion-Atom Collisions
Investigation of the asymmetry of the charge transfer into continuum in collisions of 155 MeV Ne^{10+} in He, 8:24539 (RA:DE:In German)
NEONATES
Sensitivity
Comparative toxicity to weanling and adult rats of lead acetate in water, 8:24465 (J:US)
NEOPLASMS
See also CARCINOMAS
LEUKEMIA
LYMPHOMAS
Radioinduction
Carcinogenesis following prenatal exposure to radiation, 8:24395 (J:DE)
NEPAL
Small-Scale Hydroelectric Power Plants
Sample survey of traditional water wheels and small water turbines in nepal: a preliminary report, 8:23242 (R:US)
NEPTUNIUM 237
Inventories
Byproduct inventories, 8:23171 (R:US)
Recovery
Technology for recovery of byproducts, 8:23173 (R:US)
NETHERLANDS
Energy Models
Determination of environment parameters for SELPE, a model for energy supply, 8:22959 (R:NL:In Dutch)
Hydroelectric Power Plants
Hydropower from Dutch rivers: a survey of potential and restrictions, 8:23241 (R:US:GE)
NETWORKS (COMPUTER)
See COMPUTER NETWORKS
NEUTRAL ATOM BEAM INJECTION
Valves
Fast shutter valve for TFTR neutral beam lines, 8:25128 (J:US)
NEUTRAL BEAM SOURCES
Development, fabrication and tests of the periplasmatron ion sources for ASDEX, 8:25088 (J:US)
Gas density distribution results for NBSTF, 8:25086 (J:US)
Improved plasma generator for the PLT/PDX neutral beam injectors, 8:25113 (J:US)
Status of the JET neutral injection system, 8:25108 (J:US)
Beam Dumps
Design of calorimeter and ion dump for JET neutral injection beam line, 8:25111 (J:US)
Beam Neutralization
Conductance thermal accommodation and beaming from neutralizer gas-cells, 8:25087 (J:US)
Beam Transport
Beam trajectories calculation code for ion source in neutral beam injector, 8:25085 (J:US)
Calorimeters
TFTR neutral beam calorimeter fabrication and instrumentation, 8:25215 (J:US)
Computerized Control Systems
Development and operation of PDX neutral beam computer system, 8:25102 (J:US)
Very high level neutral beam control system, 8:25104 (J:US)
Construction
Construction of prototype injector unit for JT-60, 8:25110 (J:US)
Control Systems
Computer control and data acquisition for neutral-beam injectors, 8:24829 (R:US)
Control of a high-power neutral beam generator by means of arc-current regulation, 8:25105 (J:US)
Data Acquisition Systems
Computer control and data acquisition for neutral-beam injectors, 8:24829 (R:US)
Design
Highlights of the Zephyr neutral beam injection system conceptual design, 8:25084 (J:US)
Eddy Currents
Magnetic shielding and eddy current effects measurements in a Doublet III neutral beam injector, 8:25091 (J:US)
Electric Arcs
Arc notching on PDX neutral beams, 8:24809 (J:US)
Electric Cables
Cable information retrieval program, 8:25106 (J:US)
Engineering
Engineering design and manufacturing of prototype neutral injector for JET, 8:25115 (J:US)

Installation
Installation and start-up of the PDX neutral beam injection system, 8:25081 (J:US)
Ion Sources
Prototype ion source for JT-60 NBI, 8:25109 (J:US)
Magnetic Shielding
Magnetic shielding and eddy current effects measurements in a Doublet III neutral beam injector, 8:25091 (J:US)
Performance
Experience with the Wendelstein VII-neutral injectors, 8:25083 (J:US)
Performance of the ASDEX neutral beam injector, 8:25082 (J:US)
Power Supplies
Design and development of an electronic crowbar for the protection of HVDC neutral beam components, 8:25092 (J:US)
Development of a high voltage crowbar, 8:25066 (J:US)
Doublet III neutral beam power system, 8:25090 (J:US)
Safety procedures for the MFTF sustaining neutral beam power supply, 8:25072 (J:US)
Reviews
Future needs for neutral beams in fusion, 8:25107 (J:US)
Technology Assessment
Industrialization and production of neutral beam ion sources for MFTF, 8:25114 (J:US)
Status and trends in the development and application of positive-ion-based neutral injectors, 8:25112 (J:US)
Temperature Effects
Conductance thermal accommodation and beaming from neutralizer gas-cells, 8:25087 (J:US)
Test Facilities
Cyrogenics for TFTR neutral beam test cell, 8:25117 (J:US)
Design of the precast, post-tensioned concrete shielding structure for the TFTR neutral beam test cell, 8:25116 (J:US)
TFTR neutral beam test facility, 8:25067 (J:US)

NEUTRINO DETECTION
Status of U.C. Irvine neutrino oscillation detector, 8:24586 (RA:US)

NEUTRINO-PROTON INTERACTIONS
See also ANTINEUTRINO-PROTON INTERACTIONS
Deep Inelastic Scattering
Direct determination of the quark density ratio d(x)/u(x) in the proton from νp and anti νp interactions, 8:24604 (R:DE)

NEUTRINOS
Oscillations
Neutrino oscillations, 8:24584 (RA:US)
Perspectives on weak interactions, 8:24579 (RA:US)
Phenomenological analysis of reactor data for neutrino oscillations, 8:24587 (RA:US)
Results of a first round 150 MeV nu/sub μ/ oscillation experiment and implications for future LAMPF experiments, 8:24597 (RA:US)

NEUTRON ACTIVATION ANALYSIS
See NEUTRON REACTIONS

NEUTRON CAPTURE
See NEUTRON REACTIONS

NEUTRON DETECTION
Measurement of neutron multiplicity distributions with scintillator tank, 8:24198 (RA:DE:In German)
Activation Detectors
Comparison between LYRA and SAND code performance for the extrapolation of data from activation detectors used for determining spectra of acceleration neutrons, 8:24203 (R:IT)
He-3 Counters
New gas mixture improves performance of ^{3}He neutron counters, 8:24207 (J:NL)

NEUTRON DETECTORS
See also ACTIVATION DETECTORS
HE-3 COUNTERS
SELF-POWERED NEUTRON DETECTORS
Sensitivity
DN detection during SLSF tests, 8:23587 (R:US)

NEUTRON DIFFRACTION
Small Angle Scattering
National Center for Small-Angle Scattering Research, 8:24732 (BA:US)

NEUTRON DIFFRACTOMETERS
Data Acquisition Systems
Data acquisition system for the neutron scattering instruments at the intense pulsed neutron source, 8:24172 (R:US)
IPNS distributed-processing data-acquisition system, 8:24173 (R:US)

NEUTRON MATTER
See NUCLEAR MATTER

NEUTRON REACTIONS
Cross Sections
DOPSEL; self-shielding in the resonance region (IBM370; FORTRAN IV), 8:24702 (R:US)
HAUSER5; nuclear reaction cross sections (UNIVAC1100/44; FORTRAN V), 8:24640 (R:US)
Re-evaluation of the neutron scattering dynamics in heavy water, generation of multigroup cross sections for THERM-126, 8:24724 (R:DE)
Self-Shielding
DOPSEL; self-shielding in the resonance region (IBM370; FORTRAN IV), 8:24702 (R:US)

NEUTRON SEPARATION ENERGY
Prediction of mass excess, β-decay energy and neutron separation energy from the atomic mass formula with empirical shell terms, 8:24643 (R:JP)

NEUTRON SOURCE FACILITIES
See also IPNS-I SYNCHROTRON
Targets
Evaluation of structural integrity of IPNS-I and ZING-P' targets, 8:24171 (R:US)

NEUTRON SPECTROMETERS
Activation Detectors
Comparison between LYRA and SAND code performance for the extrapolation of data from activation detectors used for determining spectra of acceleration neutrons, 8:24203 (R:IT)
Specifications
National Center for Small-Angle Scattering Research, 8:24732 (BA:US)

NEUTRONS
Oscillations
Neutron oscillations, 8:24619 (RA:US)
RBE
Radiation carcinogenesis (Neutrons, ultraviolet radiation), 8:24388 (RA:US)
Slowing-Down
DEMONR; unbiased Monte Carlo slab shield code (IBM360/65; FORTRAN IV), 8:24716 (R:US)
Transmission
SPAR1; shielding with analytic ray-tracing (CDC6600,7600; FORTRAN IV), 8:24719 (R:US)

NEVADA
See also STEAMBOAT SPRINGS
Geological Surveys
Sources of compass error in tunnel mapping, 8:24495 (J:US)
Ground Water
Two-dimensional, steady-state model of ground-water flow, Nevada Test Site and vicinity, Nevada-California, 8:24484 (R:US)

NEVADA TEST SITE
Ground Water
Two-dimensional, steady-state model of ground-water flow, Nevada Test Site and vicinity, Nevada-California, 8:24484 (R:US)
Petrography
Detailed petrographic descriptions and microprobe data for drill holes USW-G2 and UE25b-1H, Yucca Mountain, Nevada, 8:24485 (R:US)
Radioactive Waste Disposal
Calculation of the probability of volcanic disruption of a high-level radioactive waste repository within southern Nevada, USA, 8:23189 (J:GB)

NEW MEXICO
Earthquakes
Earthquake catalog for northern New Mexico. Progress report, January-March 1982, 8:24489 (R:US)

NEW YORK
Black Shales
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Government Policies
State-local relations and urban technology: a study in intergovernmental decision making - executive summary, 8:24304 (R:US)
State-local relations and urban technology: a study in intergovernmental decision making, 8:24305 (R:US)
Low-Head Hydroelectric Power Plants
Upper Mechanicville Hydroelectric Redevelopment Project: project-management plan. Small-Scale Hydroelectric Power Demonstration Project, 8:23245 (R:US)
Natural Gas Deposits
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
NEWBORNS
See INFANTS
NEONATES
NICKEL
Breakdown
High field conduction and dielectric breakdown in nominally pure and nickel-doped MgO crystals at high temperatures, 8:24009 (J:US)
Catalytic Effects
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R:US)
Pilot-plant study of an adiabatic parallel-plate methanation reactor (Raney nickel), 8:23220 (R:US)
Chemical Composition
Pilot-plant study of an adiabatic parallel-plate methanation reactor (Raney nickel), 8:23220 (R:US)
Crystal Field
Hyperfine fields at ^{19}F in nickel in the critical region, 8:23958 (RA:DE:In German)
Hyperfine field at ^{23}Na in nickel, 8:23959 (RA:DE:In German)
Dielectric Properties
High field conduction and dielectric breakdown in nominally pure and nickel-doped MgO crystals at high temperatures, 8:24009 (J:US)
Electric Conductivity
High field conduction and dielectric breakdown in nominally pure and nickel-doped MgO crystals at high temperatures, 8:24009 (J:US)
Intergranular Corrosion
Grain boundary segregation and intergranular corrosion of nickel, 8:23898 (RA:US)
Ion-Atom Collisions
Observation of the recoil effect on the K-shell excitation probabilities in ion-atom collisions, 8:24543 (RA:DE:In German)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
Vacancies
Positron annihilation in solid and liquid Ni, 8:23940 (R:US)
Positron-annihilation measurements of vacancy formation in Ni and Ni(Ge), 8:23941 (R:US)
Vacancy formation in Ni and Ni(Ge), 8:23933 (R:US)
NICKEL 58 TARGET
Carbon 12 Reactions
Light particle emission from the reaction of ^{12}C with ^{58}Ni and ^{197}Au at 25 MeV per nucleon, 8:24666 (RA:DE:In German, English)
Carbon 13 Reactions
Search for giant resonance charge exchange modes using the (^{13}C,^{13}N) reaction, 8:24658 (RA:DE:In German, English)
Neon 20 Reactions
Excitation of the giant quadrupole resonance in ^{58}Ni by 40 MeV ^{20}Ne, 8:24657 (RA:DE:In German)
NICKEL 60 TARGET
Neon 20 Reactions
Measurement of coincidences between evaporation residues and fast light particles, 8:24668 (RA:DE:In German)
NICKEL 63
NMR Spectra
Local susceptibility of ^{63}Ni in palladium, 8:23960 (RA:DE:In German)
NICKEL ALLOYS
See also NICKEL BASE ALLOYS
NICKEL STEELS
Corrosion
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
Sea water corrosion of two-phase Cu-10Ni-8Sn, 8:23897 (RA:US)
Corrosion Resistance
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Crystallization
Stem observation of crystallization in thin films of amorphous Fe/sub 40/Ni/sub 40/P/sub 14/B/sub 6/, 8:23984 (J:US)
Electrochemical Corrosion
Corrosion behavior of high density tungsten alloys, 8:23899 (RA:US)
Intergranular Corrosion
Grain boundary segregation and intergranular corrosion of nickel, 8:23898 (RA:US)
Moessbauer Effect
Moessbauer spectrometry study of Fe-Ni-X alloys, 8:23970 (R:US)
Phase Studies
Stem observation of crystallization in thin films of amorphous Fe/sub 40/Ni/sub 40/P/sub 14/B/sub 6/, 8:23984 (J:US)
Physical Radiation Effects
Surface segregation in concentrated Ni-Cu alloys under irradiation (Ni-10Cu; Ni-60Cu), 8:23943 (R:US)
Sputtering
Ion-bombardment-induced subsurface composition modifications in alloys at elevated temperatures (Cu - 40 at. % Ni), 8:23932 (R:US)
Surface Properties
Imaging and analysis of surfaces using diffracted electrons, 8:24068 (BA:US)
NICKEL BASE ALLOYS
See also HASTELLOY C
HAYNES 188 ALLOY
INCONEL ALLOYS
Brittle-Ductile Transitions
Role of grain size on the brittle-to-ductile transition of the strongly ordered alloy Ni_3Al: report on progress during year-2, 8:23952 (R:US)
Corrosion
Plant Materials Program: progress June 1981-May 1982, 8:23465 (R:US)
Ductility
Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys (Metglas 2826, BNi-3, BNi-6, FeBSi, FeBCSi), 8:23916 (RA:US)
Embrittlement
Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys (Metglas 2826, BNi-3, BNi-6, FeBSi, FeBCSi), 8:23916 (RA:US)
Metallographic and fractographic aspects of liquid-metal embrittlement (Al-Zn-Mg (6.3% Zn 2.9% Mg); Ni 200 alloy (99.5% Ni); Inconel 601; D6AC steel), 8:23915 (RA:US)
Fractures
Metallographic and fractographic aspects of liquid-metal embrittlement (Al-Zn-Mg (6.3% Zn 2.9% Mg); Ni 200 alloy (99.5% Ni); Inconel 601; D6AC steel), 8:23915 (RA:US)
Hydrogen Embrittlement
Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys (Metglas 2826, BNi-3, BNi-6, FeBSi, FeBCSi), 8:23916 (RA:US)

Mechanical Properties
Role of grain size on the brittle-to-ductile transition of the strongly ordered alloy Ni_3Al: report on progress during year-2, 8:23952 (R:US)
Physical Radiation Effects
Surface segregation in concentrated Ni-Cu alloys under irradiation (Ni-10Cu; Ni-60Cu), 8:23943 (R:US)
Stress Corrosion
Long time corrosion testing with and without mechanical stress of high temperature alloys for blades of land based gas turbines with high output, 8:23892 (R:DE:In German)
Tensile Properties
Liquid metal and hydrogen embrittlement of nickel and iron-base amorphous alloys (Metglas 2826, BNi-3, BNi-6, FeBSi, FeBCSi), 8:23916 (RA:US)
Vacancies
Positron-annihilation measurements of vacancy formation in Ni and Ni(Ge), 8:23941 (R:US)
Vacancy formation in Ni and Ni(Ge), 8:23933 (R:US)

NICKEL COMPLEXES
Liquid Column Chromatography
Fractionations of non-porphyrin complexes of vanadium and nickel from Boscan crude oil, 8:24047 (R:US)

NICKEL HYDRIDES
Interstitials
Interstitial site occupation in ZrNiH, 8:23997 (R:US)

NICKEL OXIDES
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Sorptive Properties
Hydrides of oxygen-stabilized intermetallic phases (Zr_3V_3O; Ti_4M_3O/sub x/ (M = Fe, Co, Ni)), 8:23998 (R:US)

NICKEL STEELS
Fracture Properties
Development of ferritic weldments for grain-refined ferritic steels for 4.2K service, 8:23971 (R:US)
Welded Joints
Development of ferritic weldments for grain-refined ferritic steels for 4.2K service, 8:23971 (R:US)

NICKEL SULFATES
Fusion Heat
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)
Melting Points
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)
Phase Diagrams
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)
Thermodynamics
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)

NICKEL-IRON BATTERIES
See IRON-NICKEL BATTERIES

NICKEL-ZINC BATTERIES
Performance Testing
Computer control of electrochemical experiments with application to zinc/nickel oxide cells, 8:23679 (R:US)
Research Programs
Status of improved lead-acid, nickel/iron, and nickel/zinc batteries being developed under DOE's electric vehicle battery program, 8:23676 (R:US)
Test Facilities
Computer control of electrochemical experiments with application to zinc/nickel oxide cells, 8:23679 (R:US)

NIOBIUM
Atom Transport
Small-polaron models for the hydrogen-concentration dependence of hydrogen diffusion in Nb, 8:23977 (J:US)
Interstitials
Investigation of interstitial trapping at the PAC probe ^{100}Pd in niobium, 8:23964 (RA:DE:In German)
Polarons
Small-polaron models for the hydrogen-concentration dependence of hydrogen diffusion in Nb, 8:23977 (J:US)

NIOBIUM 92
Inhalation
Preliminary analysis of data obtained from participation in the IAEA human-mock plutonium intercalibration experiment, 8:24367 (RA:US)
Tissue Distribution
Preliminary analysis of data obtained from participation in the IAEA human-mock plutonium intercalibration experiment, 8:24367 (RA:US)

NIOBIUM ALLOYS
See also INCONEL 600
INCONEL 625
NIOBIUM BASE ALLOYS
Electrical Testing
Origin of resistive voltage and the related problems in large-capacity Nb_3Sn conductor, 8:25020 (J:US)
Soldering
Soldering studies of an aluminum stabilized superconductor, 8:25048 (J:US)
Superconductivity
Specific heat of in situ superconducting composites, 8:23973 (J:US)

NIOBIUM BASE ALLOYS
Current Density
Current densities of commercial NbTi-based alloys for high field applications, 8:24118 (J:US)

NITRATES
See also BARIUM NITRATES
Deposition
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
Mass Balance
Lake acidification during spring snowmelt: processes and causes, 8:24285 (RA:US)
Washout
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)

NITRIC ACID
Atmospheric Chemistry
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Equilibrium
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Phase Studies
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Photoelectron Spectroscopy
Laser photoelectron spectroscopy of ions. Progress report, August 1, 1982-July 31, 1983, 8:24527 (R:US)

NITRIC OXIDE
NO.
Effect of secondary combustion on nitric oxide concentrations in a MHD combustion gas, 8:23767 (R:US)

NITRIDES
See also ALUMINIUM NITRIDES
SILICON NITRIDES
TITANIUM NITRIDES
Optical Properties
Optical properties of solids for solar energy conversion, 8:24006 (R:US)

NITRO COMPOUNDS
See also NITROMETHANE
Adsorption
Studies of molecular adsorbates at interfaces by optical second-harmonic generation (p-nitrobenzoic acid), 8:24069 (R:US)
Genetic Effects
Induction of chromosome aberrations, sister chromatid exchanges and specific locus mutations by radiation and chemicals, and the application of the studies to population monitoring and risk estimation, 8:24376 (RA:US)
Mutagen Screening
Mammalian cell genetic toxicology, 8:24416 (RA:US)

NITROGEN
Ion-Molecule Collisions
Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982, 8:24522 (R:US)
Mineralization
Effects of simulated acid precipitation on carbon and nitrogen mineralization in soil, 8:24256 (RA:US)

NITROGEN 16
Beta-Minus Decay
0^- to 0^+ beta decay in A = 16, 8:24644 (R:US)
NITROGEN DIOXIDE
NO_2
Biological Effects
Effect of NO_2 and SO_2 alone and in combination on the productivity of field-grown soybeans, 8:24406 (R:US)
NITROGEN IONS
Ion-Atom Collisions
Target-thickness dependence of K-shell vacancy fractions in foil-excited ion beams, 8:24557 (J:US)
NITROGEN NITRIDES
See NITROGEN
NITROGEN OXIDES
See also NITRIC OXIDE
NITROGEN DIOXIDE
Air Pollution Abatement
Multi-fuel low-NO/sub x/ burner development, Phase II. Final report Mar 79-Feb 82, 8:24152 (R:US)
Atmospheric Chemistry
Atmospheric cycles of nitrogen oxides and ammonia, 8:24239 (R:US)
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Chemical Reaction Yield
Shoreside boiler demonstration of fuel-water emulsions. Final report Mar 80-Aug 82, 8:23047 (R:US)
Equilibrium
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Gas Spills
Large-scale hazardous gas release experiments, 8:23069 (R:US)
Personnel Monitoring
State-of-the-art of commercially available personal monitors for NO/sub x/, SO_2 and particulate matter in ambient air, 8:24246 (J:US)
Phase Studies
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Reduction
Advanced environmental control technology , 8:22952 (R:US)
Removal
Advanced environmental control technology , 8:22952 (R:US)
DOE's electron-beam-irradiation development program, 8:22954 (R:US)
Simultaneous removal of SO_2 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R:US)
Scavenging
Precipitation-scavenging chemistry for sulfate and nitrate from the SURE and related data. Volume 2. Final report, 8:24224 (R:US)
NITROMETHANE
Dissociation
Photodissociation of nitromethane at 266 nm, 8:24562 (J:US)
NITROSAMINES
Biological Effects
Chemical effects on the immune system, 8:24448 (RA:US)
Immunosuppression
Chemical effects on the immune system, 8:24448 (RA:US)
Mutagenesis
Comparative mutagenesis, 8:24415 (RA:US)
NITROSO COMPOUNDS
See also METHYL NITROSOUREA
NITROSAMINES
Biological Effects
DNA repair studies in mammalian germ cells, 8:24433 (RA:US)
Effect of ethylnitrosourea, methylnitrosourea, and hydroxyethylnitrosourea on the testis, 8:24440 (RA:US)
Genetic Effects
Dose-response curve for ethylnitrosourea-induced specific-locus mutations in mouse spermatogonia, 8:24421 (RA:US)
Effect of dose fractionation on the ethylnitrosourea induction of specific-locus mutations in mouse spermatogonia and its bearing on risk estimation, 8:24422 (RA:US)
Effect of sex and cell stage on induction of mutations by ethylnitrosourea in the mouse, 8:24423 (RA:US)
Ethylnitrosourea is also a supermutagen for dominant skeletal mutations, 8:24428 (RA:US)
Mammalian biochemical genetics (X radiation and mutagens), 8:24379 (RA:US)
Nature of specific-locus mutations induced by ethylnitrosourea in mouse spermatogonia, 8:24424 (RA:US)
Metabolism
Comparative mutagenesis, 8:24415 (RA:US)
Mutagen Screening
Investigation of the supermutagen ENU and other substances in the Mouse Spot Test, 8:24427 (RA:US)
Mammalian cell genetic toxicology, 8:24416 (RA:US)
Mutagenesis
Comparative mutagenesis, 8:24415 (RA:US)
Toxicity
Cytometrics, 8:24450 (RA:US)
NITROUS ACID
Atmospheric Chemistry
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Equilibrium
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Phase Studies
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
NO. 2 FUEL OIL
See HEATING OILS
NOISE THERMOMETERS
Design
Sandia technology, 8:23882 (R:US)
Performance
Sandia technology, 8:23882 (R:US)
NON-DISPERSIVE ION WAVES
See ION ACOUSTIC WAVES
NONLINEAR PROBLEMS
Optimization
OPTIMIZERS; nonlinear optimization subroutines (IBM360,370; FORTRAN IV), 8:25252 (R:US)
NONLINEAR SYSTEMS
See NONLINEAR PROBLEMS
NONRADIOACTIVE WASTE DISPOSAL
See WASTE DISPOSAL
NONRADIOACTIVE WASTES
See GASEOUS WASTES
SOLID WASTES
NORTH DAKOTA
Coal Deposits
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume VIII. Coal quality analysis (Proposed methanol project near Dunn Center, North Dakota), 8:23236 (R:US)
NOVA FACILITY
Nova laser system for inertial confinement fusion, 8:25140 (J:US)
Alignment
Nova alignment and laser diagnostics systems - 1, 8:25146 (J:US)
Nova alignment and laser diagnostics systems - 2, 8:25147 (J:US)
Computer Networks
Novanet, a local computer network, and Nova target data acquisition system, 8:25152 (J:US)
Control Systems
Nova control system - goals, architecture, and central system design, 8:25151 (J:US)
Data Acquisition Systems
Novanet, a local computer network, and Nova target data acquisition system, 8:25152 (J:US)
Diagnostic Techniques
Nova alignment and laser diagnostics systems - 2, 8:25147 (J:US)
Energy Storage
Nova power systems and energy storage - 1, 8:25143 (J:US)
Nova power systems and energy storage - 2, 8:25144 (J:US)
Frequency Converters
Nova frequency conversion system, 8:25148 (J:US)

Mechanical Structures
Nova mechanical systems, 8:25141 (J:US)
Optical Equipment
Optical components for the Nova laser, 8:25142 (J:US)
Power Supplies
2.0 MVA voltage doubler power supply for capacitor bank charging, 8:25068 (J:US)
Power Systems
Nova power systems and energy storage - 1, 8:25143 (J:US)
Nova power systems and energy storage - 2, 8:25144 (J:US)
Pulse Generators
Nova front end subsystem, 8:25145 (J:US)
Safety
Laser sequencing, synchronization, and safety systems, 8:25150 (J:US)
Targets
Nova target systems, 8:25149 (J:US)

NRTS
See IDAHO NATIONAL ENGINEERING LABORATORY

NUCLEAR ACCIDENTS
See ACCIDENTS

NUCLEAR ATTACKS
See NUCLEAR WEAPONS

NUCLEAR CONTROVERSY
See HUMAN POPULATIONS

NUCLEAR EXPLOSION DETECTION
Seismic Detection
Investigations of near-source structural effects on body waves. Part II. Yucca Flats; receiver functions appropriate to NTS; motive functional specifications. Annual technical report, 8:24221 (R:US)
Seismic discrimination. Semiannual technical sumMary report no. 36, 1 Oct 81-31 mar 82, 8:24222 (R:US)

NUCLEAR EXPLOSIONS
Specifically named single nuclear explosions are listed by name and the word EVENT, e.g., BOXCAR EVENT. All projects involving nuclear explosions are listed by the project name and the word PROJECT, e.g., PLOWSHARE PROJECT.
Energy Yield
Yield determination using long-wavelength black-body radiation from an underground nuclear explosion, 8:24220 (R:US)
Radiation Hazards
Analysis of radiation exposure for troop observers, Exercise Desert Rock VI, Operation Teapot. Final report 1 Mar-15 Jul 80, 8:24359 (R:US)
Analysis of radiation exposure, 4th Marine Corps provisional atomic exercise brigade, exercise Desert Rock VII, Operation Plumbbob. Final report 1 Mar 80-15 Jun 81, 8:24360 (R:US)

NUCLEAR FACILITIES
See also FEED MATERIALS PLANTS
FUEL FABRICATION PLANTS
FUEL REPROCESSING PLANTS
NUCLEAR POWER PLANTS
RADIOACTIVE WASTE FACILITIES
Legal Aspects
Title list of documents made publicly available, December 1-31, 1982, 8:23525 (R:US)
Radiation Doses
NRC TLD Direct Radiation-Monitoring Network. Progress report, July-September 1982, 8:24264 (R:US)
Radiation Monitoring
NRC TLD Direct Radiation-Monitoring Network. Progress report, July-September 1982, 8:24264 (R:US)
Radioactivity Transport
UDAD; uranium dispersion & dosimetry model (IBM370,303x; FORTRAN IV (94%), PLL/I (4%), and Assembly language (2%). The only use of PL/I is the auxiliary plotting program, CONTOUR. The only use of Assembly language is the DATE, Gregorian calendar date routine), 8:23187 (R:US)
Safeguards
Safeguards Summary Event List (SSEL), 8:23195 (R:US)

NUCLEAR FORCES
Nuclear Models
Nuclear forces and nuclear matter including pions and isobars, 8:24703 (R:US)

NUCLEAR FUEL ELEMENTS
See FUEL ELEMENTS

NUCLEAR FUELS
See also DISPERSION NUCLEAR FUELS
SPENT FUELS
Production
Mixed uranium dicarbide and uranium dioxide microspheres and process of making same, 8:23107 (P:US)

NUCLEAR INDUSTRY
Radiation Accidents
Search of the Russian scientific literature for the descriptions of the medical consequences of the Kyshtym accident, 8:23188 (R:US)
Reviews
Nuclear power industry, 1981, 8:23442 (R:US)

NUCLEAR MATERIALS DIVERSION
Detection
Vehicle monitors for domestic perimeter safeguards, 8:23192 (R:US)

NUCLEAR MATERIALS MANAGEMENT
Accounting
Isotope correlations for safeguards surveillance and accountancy methods, 8:23190 (R:US)
Operational advanced materials control and accountability system, 8:23198 (J:US)
Selected measurement methods for plutonium and uranium in the nuclear fuel cycle, 8:23197 (R:US)
Measuring Methods
Progress report for the period October 1981-September 1982, 8:23194 (R:US)
Radiometric Analysis
Active neutron coincidence counting for the assay of MTR fuel elements, 8:23193 (R:US)
Safeguards
Isotope correlations for safeguards surveillance and accountancy methods, 8:23190 (R:US)
Safeguards Summary Event List (SSEL), 8:23195 (R:US)
Vehicle monitors for domestic perimeter safeguards, 8:23192 (R:US)

NUCLEAR MATTER
Binding Energy
Supernuclei, supernuclear matter & SU(4) symmetry, 8:24616 (RA:US)

NUCLEAR MODELS
See also CLUSTER MODEL
Nuclear forces and nuclear matter including pions and isobars, 8:24703 (R:US)

NUCLEAR PHYSICS
Use only for indexing articles of very broad coverage, such as annual reviews, text books, etc.
Computer Codes
Software developments, 8:25273 (RA:DE:In German)
Research Programs
Scientific progress report 1981, 8:24642 (R:DE:In German and English)

NUCLEAR POWER
Monthly energy review, 8:23002 (R:US)

NUCLEAR POWER PLANTS
See also UNDERGROUND NUCLEAR STATIONS
Air Samplers
Mechanical-reliability evaluation of a proposed emergency-response radioiodine air sampler, 8:24249 (R:US)
Computerized Simulation
DSNP; dynamic simulation nuclear power plants (IBM370; FORTRAN IV and DSNP), 8:23539 (R:US)
Containment Buildings
Windfield and trajectory models for tornado-propelled objects. Final report, 8:23614 (R:US)
Containment Shells
Buckling investigation of ring-stiffened cylindrical shells with reinforced openings under unsymmetrical axial loads, 8:23551 (R:US)
Full-scale turbine-missile concrete impact experiments. Final report, 8:23610 (R:US)

Control Rooms
Technical issues related to NUREG 0800, Chapter 18: Human Factors Engineering/Standard Review Plan, 8:23531 (R:US)
Economic Analysis
Investment analysis in electricity supply. Staff working paper, 8:23422 (R:US)
Projected costs of electricity from nuclear and coal-fired power plants. Volume 2, 8:23741 (R:US)
Electrical Equipment
Summary of the Plant Electrical Systems (PES) Study, 8:23550 (R:US)
Legal Aspects
Operating reactors licensing actions summary, 8:23527 (R:US)
Operating Cost
Projected costs of electricity from nuclear and coal-fired power plants. Volume 2, 8:23741 (R:US)
Performance
PREMOR; two-group point reactor power plant model (IBM360,370,303x; FORTRAN IV (97%) and Assembler (3%)), 8:23540 (R:US)
Power Generation
Electric power monthly (For July 1982), 8:23736 (R:US)
Electric power monthly (For November 1981), 8:23731 (R:US)
Electric power monthly (For April 1982), 8:23733 (R:US)
Electric power monthly (For June 1982), 8:23735 (R:US)
Electric power monthly (For May 1982), 8:23734 (R:US)
Electric power monthly (For February 1982), 8:23732 (R:US)
Electric power monthly, 8:23738 (R:US)
Electric power monthly (For October 1982), 8:23737 (R:US)
Electric Power Monthly, 8:23739 (R:US)
Radioactive Effluents
XOQDOQ; nuclear power plant effluent releases (IBM370,303x; FORTRAN IV), 8:23572 (R:US)
Reactor Control Systems
Cognitive models and computer aids for nuclear plant control room operators, 8:23559 (RA:US)
Cognitive models embedded in system simulation models, 8:23565 (RA:US)
Framework for modeling supervisory control behavior of operators of nuclear power plants, 8:23558 (RA:US)
Human cognition, 8:23562 (RA:US)
Outline of a model of human problem solving in failure situations, 8:23564 (RA:US)
Role of cognitive models of operators in the design, operation and licensing of nuclear power plants, 8:23557 (RA:US)
Role of conceptual models in nuclear power plant operation, 8:23563 (RA:US)
Rule-based approach to cognitive modeling of real-time decision making, 8:23566 (RA:US)
Visual momentum: an example of cognitive models applied to interface design, 8:23560 (RA:US)
Workshop on cognitive modeling of nuclear-plant control-room operators, 8:23556 (R:US)
Reactor Decommissioning
Funding nuclear-power-plant decommissioning. Final report, 8:23536 (R:US)
Reactor Licensing
Regulatory licensing status summary report. Nuclear power plants data for decisions (blue book), February 1-February 28, 1983, 8:23526 (R:US)
Reactor Operation
Licensed operating reactors. Status summary report data as of October 31, 1982, 8:23523 (R:US)
Operating experiences with nuclear power plants in the Federal Republic of Germany (1974 summary), 8:23444 (TJ:US)
Operating reactors licensing actions summary, 8:23527 (R:US)
Reactor Operators
Cognitive models and computer aids for nuclear plant control room operators, 8:23559 (RA:US)
Cognitive models embedded in system simulation models, 8:23565 (RA:US)
Framework for modeling supervisory control behavior of operators of nuclear power plants, 8:23558 (RA:US)
Human cognition, 8:23562 (RA:US)
Outline of a model of human problem solving in failure situations, 8:23564 (RA:US)
Role of cognitive models of operators in the design, operation and licensing of nuclear power plants, 8:23557 (RA:US)
Role of conceptual models in nuclear power plant operation, 8:23563 (RA:US)
Rule-based approach to cognitive modeling of real-time decision making, 8:23566 (RA:US)
Workshop on cognitive modeling of nuclear-plant control-room operators, 8:23556 (R:US)
Reactor Safety
Selected review and evaluation of US safety research vis-a-vis foreign safety research for nuclear power plants, 8:23636 (R:US)
Reviews
Nuclear power industry, 1981, 8:23442 (R:US)
Risk Assessment
An incentive approach to eliciting probabilities. Research report, 8:24307 (R:US)
Human-reliability data bank for nuclear power plant operations. Volume 1. A review of existing human-reliability data banks, 8:23630 (R:US)
Interim Reliability Evaluation Program procedures guide, 8:23629 (R:US)
Safeguards
Acceptance criteria for determining armed response force size at nuclear power plants, 8:23196 (R:US)
Security Personnel
Acceptance criteria for determining armed response force size at nuclear power plants, 8:23196 (R:US)
Site Selection
Investment analysis in electricity supply. Staff working paper, 8:23422 (R:US)
Steam Generators
Intergranular attack in Inconel 600 nuclear steam generator tubes, 8:23923 (RA:US)
Structural Models
Application of reduction methods to nuclear power plant structures, 8:23634 (R:US)
Technology Assessment
Energy technology data handbook. Vol. 1, 8:23423 (R:DE)

NUCLEAR POWER STATIONS
See NUCLEAR POWER PLANTS

NUCLEAR REACTION ANALYSIS
Specifications
Analytical applications of neutron capture gamma-ray spectroscopy, 8:24049 (R:DE)

NUCLEAR REACTION ANALYZERS
Design
Analytical applications of neutron capture gamma-ray spectroscopy, 8:24049 (R:DE)

NUCLEAR REACTIONS
See also BREAKUP REACTIONS
COMPOUND-NUCLEUS REACTIONS
FISSION
FUSION REACTIONS
HADRON REACTIONS
THERMONUCLEAR REACTIONS
Cross Sections
ALVIN; differential-integral data consistency (CDC7600; FORTRAN IV), 8:24639 (R:US)
HAUSER5; nuclear reaction cross sections (UNIVAC1100/44; FORTRAN V), 8:24640 (R:US)
Data Analysis
ALVIN; differential-integral data consistency (CDC7600; FORTRAN IV), 8:24639 (R:US)
Potential Scattering
Determination of potentials from the scattering function, 8:24712 (RA:DE:In German, English)
Quantum Chromodynamics
Implications of QCD for soft hadronic and nuclear processes, 8:24612 (RA:US)

NUCLEAR REACTORS
See REACTORS

NUCLEAR SAFETY
See RADIATION PROTECTION

NUCLEAR WASTES
See RADIOACTIVE WASTES

NUCLEAR WEAPON TESTS
See NUCLEAR EXPLOSIONS
NUCLEAR WEAPONS
Information Dissemination
Public access to classified reports at the Los Alamos Scientific Laboratory, 8:25282 (R:US)
NUCLEATION
Kinetics
Multistate kinetics of nucleation in the presence of an aerosol, 8:24064 (J:US)
NUCLEI
See also HYPERNUCLEI
High Spin States
High spins in gamma-soft nuclei, 8:24704 (R:US)
M1-Transitions
Role of M1 transitions in the quasicontinuum, 8:24672 (R:US)
Mass Defect
Prediction of mass excess, β-decay energy and neutron separation energy from the atomic mass formula with empirical shell terms, 8:24643 (R:JP)
Neutron Separation Energy
Prediction of mass excess, β-decay energy and neutron separation energy from the atomic mass formula with empirical shell terms, 8:24643 (R:JP)
NUCLEIC ACIDS
See also DNA
Biosynthesis
Nucleic acid biochemistry of cells, 8:24315 (RA:US)
Catabolism
Nucleic acid biochemistry of cells, 8:24315 (RA:US)
NUCLEOGENESIS
See NUCLEOSYNTHESIS
NUCLEON-ANTINUCLEON INTERACTIONS
See also PROTON-ANTIPROTON INTERACTIONS
Particle Production
Antiproton-nucleon experiments, 8:24590 (RA:US)
NUCLEOSYNTHESIS
See also THERMONUCLEAR REACTIONS
Are there superheavy atomic nuclei, 8:24705 (R:DE:In German)

O

O GROUPS
Irreducible Representations
Relations between irreducible representations of the hyperoctahedral group and O(4) and SO(4), 8:24630 (R:DE)
OCCLUSION COMPLEXES
See CLATHRATES
OCEAN THERMAL ENERGY CONVERSION
Environmental Impacts
Ocean Thermal Energy Conversion: environmental effects assessment program plan 1981-85, 8:23309 (R:US)
Hybrid Systems
Prospects of energy transformation between fusion reactor and OTEC plant, 8:25132 (J:US)
OCEAN THERMAL POWER PLANTS
Engineering
OTEC support services. Quarterly technical progress report No. 19, November 15, 1982-February 14, 1983, 8:23308 (R:US)
Heat Exchangers
OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J:US)
Marketing Research
Identification of types of businesses with potential interest in operating and/or exporting ocean thermal energy conversion (OTEC) plants, 8:23760 (R:US)
Program Management
OTEC support services. Quarterly technical progress report No. 19, November 15, 1982-February 14, 1983, 8:23308 (R:US)
OCONEE-1 REACTOR
Fuel Rods
Extended burnup fuel performance, 8:23476 (RA:US)
OECD
Energy Demand
Documentation of International Energy Evaluation System, 8:23712 (R:US)
Energy Models
Documentation of International Energy Evaluation System, 8:23712 (R:US)
OFFICE BUILDINGS
Energy Conservation
Analysis of commercial energy-conservation data. Final report, 8:23813 (R:US)
Lighting Systems
Occupancy-controlled lighting: energy-savings demonstration and analysis, 8:23825 (R:US)
Solar Air Conditioning
Solar-energy-system performance evaluation. Reedy Creek Utility District office building, Lake Buena Vista, Florida, September 1978-February, 1979, 8:23343 (R:US)
Solar Space Heating
Solar-energy-system performance evaluation: Terrell D. Moseley office building, Lynchburg, Virginia, October 1978-March 1979, 8:23341 (R:US)
Solar-energy-system performance evaluation. Reedy Creek Utility District office building, Lake Buena Vista, Florida, September 1978-February, 1979, 8:23343 (R:US)
Solar-energy-system performance evaluation: Rademaker Corporation office and warehouse building, Louisville, Kentucky, October 1978-March 1979, 8:23340 (R:US)
Solar-energy-system performance evaluation: Blakedale Professional Center Office Suite, Greenwood, South Carolina, October 1978-March 1979, 8:23342 (R:US)
Solar Water Heating
Solar-energy-system performance evaluation: Rademaker Corporation office and warehouse building, Louisville, Kentucky, October 1978-March 1979, 8:23340 (R:US)
Solar-energy-system performance evaluation: Blakedale Professional Center Office Suite, Greenwood, South Carolina, October 1978-March 1979, 8:23342 (R:US)
OFFICE FURNITURE
Property Management
Management of furniture at Department of Energy headquarters locations, 8:25228 (R:US)
OFFICIAL TRAVEL
See TRAVEL
OFF-PEAK ENERGY STORAGE
Electric Batteries
Batteries for load leveling, 8:23408 (R:US)
Feasibility Studies
Assessment of cool storage in commercial building applications, 8:23664 (R:US)
OFFSHORE OPERATIONS
Environmental Impacts
Proceedings of a workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of Outer Continental Shelf development, 8:23040 (R:US)
OFFSHORE PLATFORMS
Includes gravity or fixed, floating, and towed platforms.
Welded Joints
Assessment of corrosion fatigue behavior of offshore structures, 8:23904 (RA:US)
Fatigue of welded structural steel in sea water, 8:23905 (RA:US)
OHIO
Black Shales
Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report, 8:23056 (R:US)
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Project to test for shale gas in Ohio. Final report, 8:23054 (R:US)

Natural Gas Deposits
Offset-Well Testing Program: drilling of Columbia Gas Company wells 10056A and 10056B, Meigs County, Ohio. Eastern Gas Shales Project. Final report, 8:23056 (R:US)
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Project to test for shale gas in Ohio. Final report, 8:23054 (R:US)
Natural Gas Wells
Project to test for shale gas in Ohio. Final report, 8:23054 (R:US)
Seismicity
Geophysical investigations of the Western Ohio-Indiana region. Annual report, October 1981-September 1982, 8:24492 (R:US)

OIL FIELDS
Equipment
Costs and indexes for domestic oil- and gas field equipment and production operations, 1982, 8:23017 (R:US)

OIL SAND MINING
Environmental Impacts
Surface mining of non-coal minerals. appendix II: mining and processing of oil shale and tar sands. Final report, 8:23081 (R:US)
Legal Aspects
Surface mining of non-coal minerals. appendix II: mining and processing of oil shale and tar sands. Final report, 8:23081 (R:US)

OIL SHALE DEPOSITS
See also NAVAL OIL SHALE RESERVES
Explosive Fracturing
Oil-shale Program. Twenty-sixth quarterly report, April 1982-June 1982, 8:23082 (R:US)

OIL SHALE INDUSTRY
Program Management
Project management in the oil shale program, 8:23078 (R:US)

OIL SHALE MINING
Environmental Impacts
Surface mining of non-coal minerals. appendix II: mining and processing of oil shale and tar sands. Final report, 8:23081 (R:US)
Legal Aspects
Surface mining of non-coal minerals. appendix II: mining and processing of oil shale and tar sands. Final report, 8:23081 (R:US)

OIL SHALE PROCESSING PLANTS
Contract Management
Dissemination of technical information from the oil-shale program, 8:23079 (R:US)
Occupational Safety
Industrial safety and health, 8:23087 (RA:US)
Permits
Environmental permits, 8:23095 (RA:US)
Program Management
Financial management in the oil-shale program, 8:23080 (R:US)
Working Conditions
Industrial safety and health, 8:23087 (RA:US)

OIL SHALE WASTE WATER
See OIL SHALES
WASTE WATER

OIL SHALES
See also BLACK SHALES
Calorific Value
Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center, 8:23085 (R:US)
Chemical Analysis
Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center, 8:23085 (R:US)
Differential Thermal Analysis
Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center, 8:23085 (R:US)
Enthalpy
Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center, 8:23085 (R:US)
Fluidized-Bed Combustion
Oil shale retorting and combustion system, 8:23083 (P:US)
Geochemistry
Occurrence of biomarkers in Green River shale oil (Isoprenoids and polycycloalkanes), 8:23086 (R:US)
Hydrology
Hydrologic resource research, 8:23091 (RA:US)
In-Situ Retorting
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
Oil-shale Program. Twenty-sixth quarterly report, April 1982-June 1982, 8:23082 (R:US)
Retorting
Oil shale retorting and combustion system, 8:23083 (P:US)
Thermal Gravimetric Analysis
Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center, 8:23085 (R:US)
Viscosity
Laboratory analyses of oil shales for US Department of Energy, Laramie Energy Technology Center, 8:23085 (R:US)

OIL SPILL FINGERPRINTING
See OIL SPILLS

OIL SPILLS
Environmental Effects
Oil persistence in tundra and its impact on the below-ground ecosystem. Final report, 8:23039 (R:US)
Persistance of Metula oil in the Strait of Magellan six and one-half years after the incident. Final report, 8:23041 (R:US)

OIL WELLS
Enhanced Recovery
Downhole steam injector, 8:23021 (P:US)
In-Situ Combustion
In-situ combustion project at Bartlett, Kansas. Final report, 8:23016 (R:US)
Microemulsion Flooding
Phase behaviour of alkylxylenesulphonate/oil/brine systems, 8:23023 (BA:FR)
Results of the Bell Creek Unit "A" micellar/polymer pilot, 8:23024 (BA:FR)
Waterflooding
Improving the injectability of high salinity brine for disposal or waterfloodings operations, 8:23027 (J:US)
Well Drilling
Analytical and experimental investigations of rock cutting using polycrystalline diamond compact drag cutters, 8:23028 (J:US)

OIL-FILLED CABLES
Cooling
Electrohydrodynamic pumping in cable pipes. Final report, 8:23435 (R:US)
Installation
Increasing pipe-cable section lengths. Final report, 8:23436 (R:US)
Insulating Oils
Electrohydrodynamic pumping in cable pipes. Final report, 8:23435 (R:US)

OILS
See also FUEL OILS
INSULATING OILS
VEGETABLE OILS
WASTE OILS
Adsorption
Magnetic powder for treatment of oil-polluted waste water and process for manufacturing the powder (Japanese patent), 8:23975 (TG:US)
Removal
Magnetic powder for treatment of oil-polluted waste water and process for manufacturing the powder (Japanese patent), 8:23975 (TG:US)

OMEGA MINUS
Mass Spectra
Three strange quark system, 8:24614 (RA:US)
ONCOGENIC TRANSFORMATIONS
Biochemistry
Tumor cell surface proteins, 8:24321 (RA:US)
Biological Indicators
Tumor cell surface proteins, 8:24321 (RA:US)
Biological Repair
Excision repair of DNA damage. III. The regulation of excision repair. Oncology overview, 8:24322 (R:US)
ONCOGENIC VIRUSES
See also LEUKEMIA VIRUSES
Vectors
LTR-vectors, 8:24338 (P:US)
ON-LINE COMPUTERS
See COMPUTERS
OOCYTES
Meiosis
Drosophila cytology and genetics, 8:24329 (RA:US)
OPEN PLASMA DEVICES
Pinch Effect
Bumpy Z-pinch, 8:24917 (J:GB)
OPERATION (REACTOR)
See REACTOR OPERATION
OPERATIONS OFFICES
See US DOE FIELD OFFICES
OPTICAL RADAR
Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants, 8:24726 (R:US)
ORE PROCESSING
Environmental Effects
Radioactivity in groundwater associated with uranium and phosphate mining and processing, 8:24298 (J:US)
ORGANIC ACIDS
Excluding NUCLEIC ACIDS and NUCLEOTIDES.
See also CARBOXYLIC ACIDS
Catalytic Effects
Oil-soluble coal-liquefaction catalyst screening (Octoic and naphthenic acids as organic ligands), 8:22936 (R:US)
ORGANIC CHLORINE COMPOUNDS
See also CHLORINATED AROMATIC HYDROCARBONS
Excitation
Optoacoustic measurements of IR multiphoton excitation of cis-3, 4-dichlorocyclobutene, 8:24547 (J:US)
Photoacoustic Spectroscopy
Optoacoustic measurements of IR multiphoton excitation of cis-3, 4-dichlorocyclobutene, 8:24547 (J:US)
ORGANIC COMPOUNDS
See also AMINES
AROMATICS
HYDROCARBONS
KETONES
NUCLEIC ACIDS
ORGANIC ACIDS
ORGANIC HALOGEN COMPOUNDS
ORGANIC NITROGEN COMPOUNDS
ORGANIC OXYGEN COMPOUNDS
ORGANIC SULFUR COMPOUNDS
PROTEINS
Gas Chromatography
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
Labelling
Organisms and compounds of unnatural isotopic composition in NMR, 8:24348 (R:US)
Mass Spectroscopy
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
Superconductivity
Some basic questions in organic superconductivity, 8:24028 (R:US)
ORGANIC FLUORINE COMPOUNDS
See also FLUORINATED ALIPHATIC HYDROCARBONS
Radiolysis
EPR study of a radical anion in x-ray irradiated trifluoroacetamide single crystals at 3 K, 8:24077 (J:US)
ORGANIC HALOGEN COMPOUNDS
See also ORGANIC CHLORINE COMPOUNDS
ORGANIC FLUORINE COMPOUNDS
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
ORGANIC INSULATORS
Physical Radiation Effects
Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (II), 8:24021 (TJ:US)
Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (III), 8:24020 (TJ:US)
ORGANIC NITROGEN COMPOUNDS
Excluding PROTEINS, AMINES, ALKALOIDS, AMINO ACIDS, NUCLEIC ACIDS, and NUCLEOTIDES.
See also NITRO COMPOUNDS
NITROSO COMPOUNDS
PORPHYRINS
PTERIDINES
Metabolism
Carcinogen activity in human and rodent cells and tissues, 8:24451 (RA:US)
Toxicity
Cytotoxicity of fossil fuel related pure compounds and complex mixtures, 8:24420 (RA:US)
ORGANIC OXYGEN COMPOUNDS
Excluding HYDROXY COMPOUNDS, CARBONIC ACID DERIVATIVES, LIPIDS, STEROIDS, CARBOHYDRATES, ORGANIC ACIDS, ALDEHYDES, KETONES and ESTERS.
See also EPOXIDES
ETHERS
Dosimetry
Molecular dosimetry of ethylene oxide in the mouse, 8:24436 (RA:US)
Genetic Effects
Inhalation mutagenesis of ethylene oxide: unscheduled DNA synthesis and dominant lethal effects, 8:24435 (RA:US)
Mutagen Screening
Use of the mouse heritable translocation test in testing chemicals (Ammoniated glycerrhizin; butylated hydroxytoluene; gum arabic; ethylene oxide), 8:24430 (RA:US)
ORGANIC SOLVENTS
Adsorption
Process for removal of organic solvents (Japanese Patent), 8:24054 (TG:US)
On-Line Measurement Systems
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Recycling
Process for removal of organic solvents (Japanese Patent), 8:24054 (TG:US)
Removal
Process for removal of organic solvents (Japanese Patent), 8:24054 (TG:US)
ORGANIC SULFUR COMPOUNDS
See also SULFONIC ACID ESTERS
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
ORGANIZATION ECONOMIC CO-OPERATION AND DE
See OECD
OSCILLATIONS (PLASMA)
See PLASMA WAVES
OSCILLOGRAPHS
Uses
Use of oscillograph records for analyzing system performance, 8:23440 (R:US)
OTEC
See OCEAN THERMAL ENERGY CONVERSION
OUTER CONTINENTAL SHELF
See CONTINENTAL SHELF
OUTPUT
See PRODUCTION

OVERBURDEN
Leachates
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R:IT)
Sorptive Properties
Effect of underground coal gasification on groundwater. Final report, 8:22960 (R:IT)
OXETANE
See ETHERS
OXIDES
See also ALUMINIUM OXIDES, BERYLLIUM OXIDES, CALCIUM OXIDES, COBALT OXIDES, COPPER OXIDES, GADOLINIUM OXIDES, IRON OXIDES, LITHIUM OXIDES, MAGNESIUM OXIDES, MANGANESE OXIDES, MOLYBDENUM OXIDES, NICKEL OXIDES, NITROGEN OXIDES, PHOSPHORUS OXIDES, SILICON OXIDES, SODIUM OXIDES, SULFUR OXIDES, TITANIUM OXIDES, TUNGSTEN OXIDES, URANIUM OXIDES, VANADIUM OXIDES, ZINC OXIDES, ZIRCONIUM OXIDES
Structural Chemical Analysis
Small-angle neutron scattering studies of a compatible polymer blend, atactic polystyrene-poly(2,6 dimethyl phenylene oxide), 8:24073 (J:GB)
OXIRANS
See EPOXIDES
OXY MODIFIED IN-SITU PROCESS
Before March 7, 1977 GARRETT PROCESS was used for this process.
Research Programs
Oil-shale Program. Twenty-sixth quarterly report, April 1982-June 1982, 8:23082 (R:US)
Waste Water
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
OXYGEN
Chemisorption
Chemisorption of oxygen on Cu(110) studied by eels and leed, 8:24744 (J:NL)
Consumption Rates
Computer-assisted system for determination of O_2 consumption and CO_2 production in man. Final report, 8:24399 (R:US)
Ion-Molecule Collisions
Reactions of ions with atomic and molecular free radicals. Final report, May 1, 1975-November 30, 1982, 8:24522 (R:US)
Production
Computer-assisted system for determination of O_2 consumption and CO_2 production in man. Final report, 8:24399 (R:US)
Raman Spectra
Collision-free coherent anti-stokes Raman spectroscopy (CARS) of molecular photofragments, 8:24558 (J:NL)
Toxicity
Systemic toxicology, 8:24442 (RA:US)
OXYGEN 16
Hypernuclei
Preliminary report on an experiment to observe Σ hypernuclei in the 1p shell nuclei, 8:24595 (RA:US)
OXYGEN 16 REACTIONS
Alpha-Transfer Reactions
Resonances in s-d shell nuclei, 8:24651 (R:US)
Heavy Ion Reactions
Complete fusion in the system $^{148}Nd + {}^{16}O$ at 10 MeV/N, 8:24687 (RA:DE:In German)
Global increase of near- and below-barrier fusion for heavier systems, 8:24664 (RA:DE:In German, English)
Intermediate Resonance
Resonances in s-d shell nuclei, 8:24651 (R:US)
Transfer Reactions
Calculation of reaction cross sections for deformed nuclei, 8:24683 (RA:DE:In German, English)
OXYGEN EFFECT (RADIOBIOLOGY)
See OXYGEN
OXYGEN HYDRIDES
See WATER
OXYMETHYLENE
See FORMALDEHYDE
OZONE
Biological Effects
Effect of NO_2 and SO_2 alone and in combination on the productivity of field-grown soybeans, 8:24406 (R:US)
Ozone impacts on the productivity of selected crops (Corn, wheat, soybean and peanut crops), 8:24403 (R:US)
Variation in photosynthesis and stomatal conductance in an ozone-stressed ponderosa pine stand: light response, 8:24455 (J:US)
Ecological Concentration
Balance of the tropospheric ozone and its relation to stratospheric intrusions indicated by cosmogenic radionuclides. Technical progress report, November 1, 1979-June 30, 1980, 8:24232 (R:US)
Spatial Distribution
Balance of the tropospheric ozone and its relation to stratospheric intrusions indicated by cosmogenic radionuclides. Technical progress report, November 1, 1979-June 30, 1980, 8:24232 (R:US)
OZONIZATION
Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R:US)

P

PACIFIC NORTHWEST LABORATORIES
See BATTELLE PACIFIC NORTHWEST LABORATORIES
PACKINGS
Comparative Evaluations
EDS-coal-liquefaction process development. Phase IV. Construction of Exxon Coal-Liquefaction Pilot Plant. Final report (Viton, Kalrez; temperature effects), 8:22919 (R:US)
Field Tests
Investigations into monolithic pump packing as a means of underground roof support. Part B: field trials at South Bulli 'B' Mine and mathematical modelling, 8:22967 (R:AU)
PAH
See POLYCYCLIC AROMATIC HYDROCARBONS
PALLADIUM
Electric Conductivity
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R:US)
Inventories
Byproduct inventories, 8:23171 (R:US)
Magnetic Properties
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R:US)
Metamagnetism of palladium, 8:23894 (R:US)
Magnetic Susceptibility
Local susceptibility of ^{62}Ni in palladium, 8:23960 (RA:DE:In German)
Recovery
Technology for recovery of byproducts, 8:23173 (R:US)
Superconductivity
Superconductivity in Au-Cr-Au and Ag-Pd-Ag epitaxial metal film sandwiches, 8:23944 (R:US)
PALLADIUM 110 TARGET
Argon 40 Reactions
Measurement of neutron multiplicity distributions with scintillator tank, 8:24198 (RA:DE:In German)

PALLADIUM IONS
Electron Spin Resonance
Optical spectroscopy and electron paramagnetic resonance of Pa^{4+} in $ThBr_4$ and $ThCl_4$ crystals, 8:23889 (J:US)
PALO VERDE-1 REACTOR
Reactor Licensing
Safety evaluation report related to the operation of Palo Verde Nuclear Generating Station, Units, 1, 2, and 3: Docket Nos. STN 50-528, STN 50-529, and STN 50-530, 8:23528 (R:US)
Reactor Safety
Safety evaluation report related to the operation of Palo Verde Nuclear Generating Station, Units, 1, 2, and 3: Docket Nos. STN 50-528, STN 50-529, and STN 50-530, 8:23528 (R:US)
PALO VERDE-2 REACTOR
Reactor Licensing
Safety evaluation report related to the operation of Palo Verde Nuclear Generating Station, Units, 1, 2, and 3: Docket Nos. STN 50-528, STN 50-529, and STN 50-530, 8:23528 (R:US)
Reactor Safety
Safety evaluation report related to the operation of Palo Verde Nuclear Generating Station, Units, 1, 2, and 3: Docket Nos. STN 50-528, STN 50-529, and STN 50-530, 8:23528 (R:US)
PALO VERDE-3 REACTOR
Reactor Licensing
Safety evaluation report related to the operation of Palo Verde Nuclear Generating Station, Units, 1, 2, and 3: Docket Nos. STN 50-528, STN 50-529, and STN 50-530, 8:23528 (R:US)
Reactor Safety
Safety evaluation report related to the operation of Palo Verde Nuclear Generating Station, Units, 1, 2, and 3: Docket Nos. STN 50-528, STN 50-529, and STN 50-530, 8:23528 (R:US)
PARABANIC ACID
See ORGANIC OXYGEN COMPOUNDS
PARTIAL DIFFERENTIAL EQUATIONS
See also KORTEWEG-DE VRIES EQUATION
MAXWELL EQUATIONS
Baecklund Transformation
Painleve property for partial differential equations, 8:25280 (J:US)
Numerical Solution
2DEPEP; elliptic, parabolic & eigenvalue solutions. (CDC6500,7600; FORTRAN IV), 8:25244 (R:US)
DISPL1; 1- and 2-dimensional kinetics-diffusion partial differential equations solution (IBM370/195,303x;CDC7600,6600,CYBER175; MORTRAN2 (80%) and FORTRAN (20%)), 8:24569 (R:US)
MOL1D; partial differential equations solution (CDC6600,7600;Amdahl470;IBM3033; FORTRAN IV), 8:25253 (R:US)
PDEONE; solutions of partial differential equations (CDC7600,6600; FORTRAN IV), 8:25239 (R:US)
Singularity
Painleve property for partial differential equations, 8:25280 (J:US)
PARTICLE SIZE CLASSIFIERS
Interferometry
MIE scattering theory for particle sizing interferometry with the dual beam laser velocimeter, 8:23773 (R:US)
PARTICLE-INDUCED X-RAY EMISSION ANALYSIS
See X-RAY EMISSION ANALYSIS
PARTICLES
When appropriate use more specific terms listed under CHARGED PARTICLES, ELEMENTARY PARTICLES, and QUASI PARTICLES.
See also DROPLETS
PARTICULATES
Light Scattering
MIE scattering theory for particle sizing interferometry with the dual beam laser velocimeter, 8:23773 (R:US)
PARTICLES (FUEL)
See FUEL PARTICLES
PARTICULATES
Prior to September 1981, this concept was indexed to PARTICLES and AEROSOLS.
Biological Effects
Analysis of health effects resulting from population exposures to ambient particulate matter. Annual progress report, July 16, 1982-March 15, 1983, 8:24407 (R:US)
Analysis of health effects resulting from population exposures to ambient particulate matter. Appendices to the annual progress report, July 16, 1982-March 15, 1983, 8:24409 (R:US)
Chemical Analysis
Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R:US)
Chemical Reaction Yield
Shoreside boiler demonstration of fuel-water emulsions. Final report Mar 80-Aug 82, 8:23047 (R:US)
Hydraulic Transport
Engineering approaches to the development of hydraulic transport, 8:24107 (R:US)
Monitoring
Real-time total-mass analysis of particulates in the stack of an industrial power plant, 8:24242 (R:US)
Mutagen Screening
Mutagenicity of diesel exhaust particle extracts: influence of driving cycle and environmental temperature, 8:24456 (J:US)
Particle Size
Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels. Progress report, February 16, 1982-February 15, 1983, 8:24082 (R:US)
Removal
Electrostatically augmented gas-cleanup devices for particular removal, 8:22947 (R:US)
PASSIVE SOLAR HEATING SYSTEMS
See also DIRECT GAIN SYSTEMS
DRUM WALLS
Performance Testing
Class B performance monitoring of passive/hybrid solar buildings, 8:23326 (R:US)
PASSIVE SOLAR WATER HEATERS
Performance
Solar-energy-system performance evaluation: Colorado Sunworks single-family residence, Longmont, Colorado, November 1978-May 1979, 8:23337 (R:US)
PATIENTS
Radiation Protection
An overview of dental radiology: a primer on dental radiology, 8:24390 (R:US)
Whole-Body Counting
Application of a multiple least-squares regression program to dual energy NaI-CsI(T1) measurements, 8:24368 (RA:US)
Body burden estimation of P-32 by measurement and calibration of Bremsstrahlung radiation produced in the head, 8:24369 (RA:US)
PCB
See CHLORINATED AROMATIC HYDROCARBONS
PDX DEVICES
Computerized Control Systems
PDX diagnostic control system, 8:25185 (J:US)
PDX operating controls, 8:25183 (J:US)
ECR Heating
60 GHz ecrh system for the PPL PDX machine, 8:25123 (J:US)
Electric Arcs
Arc notching on PDX neutral beams, 8:24809 (J:US)
Getters
Design and test results of an in-torus zirconium/aluminum getter pump system for PDX, 8:25211 (J:US)
Reduction of recycling by pumping at the PDX limiter, 8:24857 (J:NL)
Impurities
Impurity levels and power loading in the PDX tokamak with high power neutral beam injection, 8:24864 (J:NL)
Limiters
Reduction of recycling by pumping at the PDX limiter, 8:24857 (J:NL)

Neutral Atom Beam Injection
Improved plasma generator for the PLT/PDX neutral beam injectors, 8:25113 (J:US)
Neutral Beam Sources
Development and operation of PDX neutral beam computer system, 8:25102 (J:US)
Improved plasma generator for the PLT/PDX neutral beam injectors, 8:25113 (J:US)
Installation and start-up of the PDX neutral beam injection system, 8:25081 (J:US)
Plasma Diagnostics
For the PDX CO/sub 2/ laser experiment. Optical mounts and shutter-window-grating system design, 8:24815 (J:US)

PEARL SPAR
See DOLOMITE

PEATLANDS
See WETLANDS

PELLET INJECTION
Mechanical configuration and shielding for FED fuel injectors and diagnostic instrumentation, 8:24962 (J:US)
Pneumatic hydrogen pellet injector development at Oak Ridge National Laboratory, 8:25118 (J:US)

PELLETS (FUEL)
See FUEL PELLETS

PENNSYLVANIA
Black Shales
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Natural Gas Deposits
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)

PENTAMETHYLENEIMINES
See PIPERIDINES

PEOPLE
See HUMAN POPULATIONS

PEOPLES REPUBLIC OF CHINA
See CHINA

PEPTIDES
Biological Effects
Peptide-induced emesis in dogs: possible relevance to radiation-induced emesis. Final report Oct 80-Sep 81, 8:24358 (R:US)

PERSONNEL
Studies of groups of persons employed in a particular field of endeavor. For studies on individuals in a group see also MAN.
See also ASTRONAUTS
CONTRACTOR PERSONNEL
DIAL PAINTERS
MEDICAL PERSONNEL
MILITARY PERSONNEL
MINERS
REACTOR OPERATORS
Information Systems
SKILLS INVENTORY; personnel information system (CDC6400,7600; FORTRAN IV; package of SKILLS, SKLFORM, AND SEARCH codes), 8:25224 (R:US)
Radiation Doses
Fourteenth annual report radiation exposures for DOE and DOE contractor employees - 1981, 8:24365 (R:US)

PERSONNEL MANAGEMENT
Government Policies
Investigation of allegations of favored treatment of a relative of a senior official of the Department of Energy, 8:25230 (R:US)
Regulations
Investigation of allegations of favored treatment of a relative of a senior official of the Department of Energy, 8:25230 (R:US)

PESTICIDES
See also HERBICIDES
Mutagen Screening
Tests of dichlorvos to see if it induces dominant skeletal mutations, 8:24429 (RA:US)

PETROCHEMICAL FEEDSTOCKS
See CHEMICAL FEEDSTOCKS

PETROLEUM
Limited to crude oil; see also COAL LIQUIDS, SHALE OIL, etc.
Documentation of International Energy Evaluation System. Volume 2, 8:23688 (R:US)
Monthly energy review, 8:23002 (R:US)
Biodegradation
Applied genetic engineering has a place in petroleum production, 8:23022 (J:US)
Chemical Composition
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Chemical Properties
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Combustion Products
Corrosion of superheaters and reheaters in fossil fired boilers, 8:23927 (RA:US)
Comparative Evaluations
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Energy Consumption
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Exports
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Fractionation
Fractionations of non-porphyrin complexes of vanadium and nickel from Boscan crude oil, 8:24047 (R:US)
Fuel Substitution
Future world oil prices: review of current forecasts, identification of price-determining factors, and delineation of a quantitative framework for analysis, 8:23035 (R:US)
Imports
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Physical Properties
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Prices
Future world oil prices: review of current forecasts, identification of price-determining factors, and delineation of a quantitative framework for analysis, 8:23035 (R:US)
Production
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R:US)
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Skin Absorption
Dermal Pathology Program, 8:24446 (RA:US)
Stockpiles
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Supply and Demand
Future world oil prices: review of current forecasts, identification of price-determining factors, and delineation of a quantitative framework for analysis, 8:23035 (R:US)
Toxicity
Dermal Pathology Program, 8:24446 (RA:US)
Transport
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Underground Storage
Geological and geotechnical studies for the construction of pilot caverns in rock for the storage of crude oil, hydrocarbon products and LPG, 8:23045 (R:DE:In German)

PETROLEUM COKE
See COKE
PETROLEUM PRODUCTS

PETROLEUM DEPOSITS
See also OIL FIELDS
Exploration
Report to the Fort Belknap Community Council on the work undertaken during the summer, 1979, 8:23014 (R:US)

Leases
Improvements needed in the cash management practices of Interior's simultaneous oil and gas leasing program in Wyoming, 8:23724 (R:US)
Resource Assessment
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 3. User's guide and guide to model applications, 8:23013 (R:US)
Seismic Surveys
Development of a telemetry system for seismic application, 8:23012 (R:DE:In German)
Three-dimensional migration of travel time maps, 8:23049 (R:DE:In German)

PETROLEUM INDUSTRY
Data Compilation
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Diversification
Mergers in the petroleum industry: report of the Federal Trade Commission, 8:23036 (R:US)
Energy Models
Oil and natural gas extraction: a game theoretic approach, 8:23031 (R:US)
Financing
Energy company development patterns in the postembargo era. An overview of financial performance, 1974-1980. Volume 1: analysis of trends (Glossary), 8:23699 (R:US)

PETROLEUM PRODUCTS
See also DIESEL FUELS
FUEL OILS
GASOLINE
KEROSENE
LIQUEFIED PETROLEUM GASES
Energy Accounting
Marginal energy cost of goods and services. Final report, 8:23037 (R:US)
Energy Consumption
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Exports
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Imports
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Production
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Stockpiles
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)
Transport
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Petroleum supply monthly (November 1982), 8:23033 (R:US)

PETROLEUM REFINERIES
Petroleum supply monthly (December 1982), 8:23034 (R:US)
Cogeneration
Potential for cogeneration in distillation. Final report, 8:23863 (R:US)
Energy Accounting
Marginal energy cost of goods and services. Final report, 8:23037 (R:US)

PETT
See POSITRON COMPUTED TOMOGRAPHY

PHAGES
See BACTERIOPHAGES

PHANTOMS
Design
Calibration of phoswich detectors for the in vivo measurement of americium, plutonium and uranium: interlaboratory comparison using the Lawrence Livermore calibration, 8:24733 (RA:US)
Design and construction of a knee phantom for the calibration of Am-241 in bone, 8:24734 (RA:US)
Whole-Body Counting
Application of a multiple least-squares regression program to dual energy NaI-CsI(T1) measurements, 8:24368 (RA:US)
Assessment of surrogate structures for whole body counting, 8:24735 (RA:US)

PHASE CHANGE MATERIALS
Use with the specific phase change material (e.g. calcium chloride) when known.
Materials Testing
Compact latent-heat thermal storage systems utilizing phase changes within the temperature range of 320 K and 340 K. Final report, 8:23358 (R:US:GE)

PHENOL
Biodegradation
Kinetics of anaerobic decomposition of phenol, 8:22949 (R:US)
Chemical Reactions
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)

PHENOLS
See also CRESOLS
PHENOL
Hydrogenation
Hydrodeoxygenation of phenolic components of wood-derived oil, 8:23279 (R:US)
Removal
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R:US)
Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R:US)

PHENYLENE RADICALS
Structural Chemical Analysis
Small-angle neutron scattering studies of a compatible polymer blend, atactic polystyrene-poly(2,6 dimethyl phenylene oxide), 8:24073 (J:GB)

PHI4-FIELD THEORY
Lattice Field Theory
Analysis of the lattice, strong coupling series for $g_0 phi^4$ field theory in d dimensions, 8:24634 (J:NL)

PHOSPHATES
For salts only; see also PHOSPHORIC ACID ESTERS.
See also SCANDIUM PHOSPHATES
SODIUM PHOSPHATES
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
Ecological Concentration
Biogeochemistry of trace metals in Chesapeake Bay. Final report, April 1, 1981-March 31, 1982, 8:24278 (R:US)

PHOSPHONIC ACID ESTERS
Chemical Preparation
Novel diphosphonic and triphosphonic esters and their preparation and uses (Patent), 8:24070 (TG:US)
Solvent Properties
Novel diphosphonic and triphosphonic esters and their preparation and uses (Patent), 8:24070 (TG:US)
Uses
Novel diphosphonic and triphosphonic esters and their preparation and uses (Patent), 8:24070 (TG:US)

PHOSPHORUS
Biological Effects
Effect of phosphorus and calcium on zinc metabolism in man, 8:24461 (J:US)
Nuclear Reaction Analysis
Analytical applications of neutron capture gamma-ray spectroscopy, 8:24049 (R:DE)

PHOSPHORUS 32
Body Burden
Body burden estimation of P-32 by measurement and calibration of Bremsstrahlung radiation produced in the head, 8:24369 (RA:US)

PHOSPHORUS OXIDES
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)

PHOTOANODES
Photolysis
Photochemical, photoelectrochemical and photobiological conversion. Final report, 8:23273 (R:US)

Protective Coatings
Photoelectrochemical behavior of n-Si electrodes protected with Pt-polypyrrole, 8:23286 (J:US)
PHOTOCHEMICAL ENERGY STORAGE
Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, September 15, 1981-November 29, 1982, 8:23264 (R:US)
PHOTOELECTROCHEMICAL CELLS
Conversion and chemical storage of solar energy in a photoelectrochemical cell. Final report, 8:23275 (R:US)
Design
Electrochemical photovoltaic cells based on n-GaAs and the triiodide/iodide redox couple in acetonitrile, 8:23285 (J:US)
Performance
Electrochemical photovoltaic cells based on n-GaAs and the triiodide/iodide redox couple in acetonitrile, 8:23285 (J:US)
Photoanodes
Kinetic aspects of the n-GaAs/(S/Se)sub(n)sup(2-) photoelectrochemical cell, 8:23262 (R:FR)
Photoelectrochemical behavior of n-Si electrodes protected with Pt-polypyrrole, 8:23286 (J:US)
Photocathodes
Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, September 15, 1981-November 29, 1982, 8:23264 (R:US)
PHOTOELECTRON SPECTROSCOPY
Electron Spectrometers
Photoelectron spectrometer for high-resolution angular resolved studies, 8:24209 (R:US)
PHOTOGRAPHIC FILMS
Images
Radiographic screen-film noise power spectrum: calibration and intercomparison, 8:24210 (J:US)
Light Scattering
Radiographic screen-film noise power spectrum: calibration and intercomparison, 8:24210 (J:US)
Noise
Radiographic screen-film noise power spectrum: calibration and intercomparison, 8:24210 (J:US)
PHOTOGRAPHS
See IMAGES
PHOTOMAGNETOELECTRIC EFFECT
See MAGNETIC FIELDS
PHOTON-ION COLLISIONS
Dissociation
UV-laser photofragmentation of a 2-MeV H_2^+ beam, 8:24515 (R:US)
PHOTOSYNTHESIS
Biological Radiation Effects
Action spectra for photosynthetic inhibition. Final report, 8:24373 (R:US)
Inhibition
Action spectra for photosynthetic inhibition. Final report, 8:24373 (R:US)
Photochemical Reactions
The photochemical dissociation of water by means of visible light, 8:23210 (R:US)
Research Programs
Studies of photosystem II using artificial donors. Progress report and renewal proposal. MML Proposal No. BI82-414, 8:24340 (R:US)
PHOTOVOLTAIC CONVERSION
Technology Assessment
System study on the possibilities of intensified use of solar energy in the Federal Republic of Germany (FRG), 8:23312 (R:DE:In German)
PHOTOVOLTAIC POWER PLANTS
Computerized Simulation
Photovoltaic requirements estimation - a simplified method. Final report, 8:23292 (R:US)
Economic Analysis
Photovoltaic requirements estimation - a simplified method. Final report, 8:23292 (R:US)
Performance
Photovoltaic requirements estimation - a simplified method. Final report, 8:23292 (R:US)
PHOTOVOLTAIC POWER SUPPLIES
Combined Collectors
Experience with a grid-interactive solar photovoltaic electric system, 8:23296 (J:US)
Cost
Flat plate photovoltaic power systems: description, design and cost. Summary report, 8:23290 (R:US)
Design
Flat plate photovoltaic power systems: description, design and cost. Summary report, 8:23290 (R:US)
Westinghouse final report: design and fabrication of a prototype system for photovoltaic residences in the Southwest, 8:23291 (R:US)
Fabrication
Westinghouse final report: design and fabrication of a prototype system for photovoltaic residences in the Southwest, 8:23291 (R:US)
Feasibility Studies
Renewable energy system feasibility study. Final report 2 Sep 80-30 Apr 82, 8:23252 (R:US)
Performance
Intermediate photovoltaic system application experiment operational performance report. Volume 14. For Beverly High School, Beverly, Massachusetts for October 1982, 8:23293 (R:US)
Intermediate photovoltaic system application experiment operational performance report. Volume 16. For Beverly High School, Beverly, MA for December 1982, 8:23295 (R:US)
Intermediate photovoltaic system application experiment operational performance report. Volume 15. For Beverly High School, Beverly, MA for November 1982, 8:23294 (R:US)
Rankine Cycle Power Systems
STESEP; solar total energy system evaluation (CDC6600,7600;IBM370; FORTRAN IV), 8:23297 (R:US)
PICEANCE CREEK BASIN
Mineralogy
Mineralogy and petrology aspects of Mesaverde Formation at Rifle Gap, Colorado, specific to the sedimentology and gas-bearing intervals in the subsurface, 8:23060 (R:US)
Petrology
Mineralogy and petrology aspects of Mesaverde Formation at Rifle Gap, Colorado, specific to the sedimentology and gas-bearing intervals in the subsurface, 8:23060 (R:US)
Stratigraphy
Approximation of continuity of lenticular Mesaverde Group sandstone lenses utilizing close-well correlations, Piceance Basin, NW Colorado. SPE 11610, 8:23059 (R:US)
PIGE ANALYSIS
See NUCLEAR REACTION ANALYSIS PROTON REACTIONS
PIGMENT CELLS
See ANIMAL CELLS
PILES
See FOUNDATIONS
PILOT PLANTS
See also BARSTOW SOLAR PILOT PLANT
Waste Water
Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R:US)
PINES
Photosensitivity
Variation in photosynthesis and stomatal conductance in an ozone-stressed ponderosa pine stand: light response, 8:24455 (J:US)
PINS (FUEL)
See FUEL PINS
PION MINUS REACTIONS
Charge-Exchange Reactions
Los Alamos: nuclear monopole, 8:24680 (J:XC)
PION MINUS-PROTON INTERACTIONS
Particle Production
Study of A_3 production in the reaction $\pi^- p \rightarrow K^0 K^- p$ at 50, 100, and 175 GeV/c, 8:24601 (J:US)

PION PLUS REACTIONS
Quasi-Elastic Scattering
Evidence against clusters in ^{12}C nuclei and against the $^1D_2$ 2140 dibaryon resonance, 8:24650 (RA:US)
PION-NUCLEON INTERACTIONS
Z*Resonances
πN, anti KN, and KN phenomenology, 8:24588 (RA:US)
PIONS
See also PIONS NEUTRAL
PIONS PLUS
Leptonic Decay
Rare decays of pions & muons: a review, 8:24581 (RA:US)
Radiative Decay
Rare decays of pions & muons: a review, 8:24581 (RA:US)
Weak Hadronic Decay
Quark-tadpole transitions and the $\Delta I = (1/2)$ rule in K decays, 8:24627 (J:US)
PIONS NEUTRAL
Particle Production
High p/sub T/ π^0 production with $\alpha\alpha$ and αp beams at the CERN ISR, 8:24577 (R:US)
PIONS PLUS
Semileptonic Decay
Preliminary report on a new pion beta decay experiment, 8:24583 (RA:US)
PIPE JOINTS
Stress Analysis
CORTES; thermal & mechanical analysis of tees (IBM360,370; FORTRAN IV; Package of EP, THFA, SHFA, SA, and TSA codes), 8:24085 (R:US)
Thermal Analysis
CORTES; thermal & mechanical analysis of tees (IBM360,370; FORTRAN IV; Package of EP, THFA, SHFA, SA, and TSA codes), 8:24085 (R:US)
PIPELINES
Data Acquisition Systems
Use of computers for the documentation of supply lines, 8:23430 (R:DE:In German)
PIPERAZINES
Infrared Spectra
Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces, 8:23901 (RA:US)
Raman Spectra
Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces, 8:23901 (RA:US)
PIPERIDINES
Infrared Spectra
Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces, 8:23901 (RA:US)
Raman Spectra
Use of infrared and Raman spectroscopy to study corrosion inhibitors on metal surfaces, 8:23901 (RA:US)
PIPES
See also DRILL PIPES
Design
Development of an optimizing method for the design of pipe systems in the ground used as heat source for heat pumps, 8:23855 (R:DE:In German)
Fluid Mechanics
Simulation of thermal-transient-induced-pipe-flow stratification using COMMIX-2, 8:23542 (R:US)
Heat Transfer
Frictional characteristics and heat transfer of antimisting fuels in tubes. Final report Aug 80-Sep 81, 8:23044 (R:US)
Installation
Development of an optimizing method for the design of pipe systems in the ground used as heat source for heat pumps, 8:23855 (R:DE:In German)
Operating Cost
Costs and indexes for domestic oil- and gas field equipment and production operations, 1982, 8:23017 (R:US)
Stress Analysis
BENDPAC; stress analysis of flanged pipe bends (IBM303x,370; FORTRAN IV (93%) and Assembly language (7%)), 8:24099 (R:US)
CURT2; curved tubes or elbows & attached pipes (IBM360,370; FORTRAN IV), 8:24084 (R:US)
Supports
SUPAN; analysis of beam-type piping supports (CDC7600; FORTRAN IV), 8:23400 (R:US)
Welded Joints
Analysis of a heat-transfer fluid fill pipe failure, 8:23914 (RA:US)
PITTSBURGH OXYDESULFURIZATION PROCESS
Feasibility Studies
Survey of coals treated by oxydesulfurization, 8:22992 (R:US)
Heat Losses
Survey of coals treated by oxydesulfurization, 8:22992 (R:US)
PITTSBURG-MIDWAY SOLVENT REFINED COAL PRO
See SRC PROCESS
PLANT CELLS
Genetic Radiation Effects
Genetic effects of the decay of radionuclides in cells, 8:24396 (TG:US)
PLANT TISSUES
Biological Radiation Effects
Protective mechanisms and acclimation to solar ultraviolet-b radiation in oenothera stricta. Final report, 8:24372 (R:US)
Biological Repair
Protective mechanisms and acclimation to solar ultraviolet-b radiation in oenothera stricta. Final report, 8:24372 (R:US)
PLANTS
See also ALGAE
EUPHORBIA
FUNGI
LEGUMINOSAE
Biological Radiation Effects
Higher plant response to elevated ultraviolet irradiance. Final report, 8:24374 (R:US)
Contamination
Oil persistence in tundra and its impact on the below-ground ecosystem. Final report, 8:23039 (R:US)
Management
Transmisson-Facilities Vegetation-Management Program: Bonneville Power Administration. Draft environmental impact statement, 8:24309 (R:US)
PLANTS (INDUSTRIAL)
See INDUSTRIAL PLANTS
PLANTS (PILOT)
See PILOT PLANTS
PLANTS (POWER)
See POWER PLANTS
PLASMA
See also COLLISIONAL PLASMA
COLLISIONLESS PLASMA
HOT PLASMA
INHOMOGENEOUS PLASMA
LASER-PRODUCED PLASMA
LOW-BETA PLASMA
RELATIVISTIC PLASMA
Alfven Waves
Alfven wave heating in general toroidal plasmas, 8:24784 (J:US)
Boundary Layers
Numerical analysis of plasma-wall interaction for an oblique magnetic field, 8:24794 (J:NL)
Control Systems
Plasma control techniques of the ASDEX feedback system, 8:25167 (J:US)
Control Theory
Analysis of external hybrid poloidal coil system, 8:24994 (J:US)
Couette Flow
Reply to the Comments of B. K. Shivamoggi, 8:24791 (J:US)
Drift Instability
Saturation of the lower-hybrid-drift instability by mode coupling, 8:24777 (J:US)
Universal mode with diffusive electrons: linear instability and nonlinear saturation, 8:24780 (J:US)
Electron Density
Electron confinement studies on the EBT-S Bumpy Torus Experiment using soft x-ray techniques, 8:24790 (J:US)
Electron Drift
Effect of a transition between regular and stochastic electron motion on the evolution of an obliquely propagating Langmuir wave, 8:24783 (J:US)

Saturation of the lower-hybrid-drift instability by mode coupling, 8:24777 (J:US)
Universal mode with diffusive electrons: linear instability and nonlinear saturation, 8:24780 (J:US)
Electron Temperature
Electron confinement studies on the EBT-S Bumpy Torus Experiment using soft x-ray techniques, 8:24790 (J:US)
Energy Transport
Quasilinear momentum and energy transport, 8:24782 (J:US)
Flow Models
Theoretical model for hot plasma flowing to a wall with recycling, 8:24870 (J:NL)
Wall material characteristics in reacting plasma modelling, 8:24876 (J:NL)
Fluctuations
Quasilinear momentum and energy transport, 8:24782 (J:US)
Impurities
Sputter-induced erosion of alkali metal surfaces - AES, XPS and SIMS studies, 8:24759 (R:US)
Interactions
Influence of collisions and incoherence on ion-cyclotron transport in mirror plasmas, 8:24789 (J:US)
Review of the plasma-material interaction problems for reacting and burning plasma experiments, 8:24796 (J:NL)
Ion Drift
Saturation of the lower-hybrid-drift instability by mode coupling, 8:24777 (J:US)
Ion Temperature
Ion heating due to parametrically driven ion wave turbulence, 8:24778 (J:US)
Laser Radiation
Some nonlinear estimates for lateral propagation of self-generated B fields, 8:24764 (R:US)
Magnetohydrodynamics
Tearing modes in a general cross-section force-free cylindrical tokamak, 8:24786 (J:US)
Momentum Transfer
Quasilinear momentum and energy transport, 8:24782 (J:US)
Nonlinear Problems
Saturation of the lower-hybrid-drift instability by mode coupling, 8:24777 (J:US)
Universal mode with diffusive electrons: linear instability and nonlinear saturation, 8:24780 (J:US)
Plasma Instability
Ion-temperature-gradient instability in toroidal plasmas, 8:24779 (J:US)
Plasma Waves
Effect of a transition between regular and stochastic electron motion on the evolution of an obliquely propagating Langmuir wave, 8:24783 (J:US)
Positioning
Shaping and controlling Dee-shaped tokamak plasmas, 8:25058 (J:US)
Stability
Reply to the Comments of B. K. Shivamoggi, 8:24791 (J:US)
Thermal stability of peripheral plasmas, 8:24795 (J:NL)
Tearing Instability
Tearing modes in a general cross-section force-free cylindrical tokamak, 8:24786 (J:US)
Temperature Gradients
Ion-temperature-gradient instability in toroidal plasmas, 8:24779 (J:US)
Transients
Reply to the Comments of B. K. Shivamoggi, 8:24791 (J:US)
Transport Theory
Influence of collisions and incoherence on ion-cyclotron transport in mirror plasmas, 8:24789 (J:US)
Turbulence
Ion heating due to parametrically driven ion wave turbulence, 8:24778 (J:US)
Universal mode with diffusive electrons: linear instability and nonlinear saturation, 8:24780 (J:US)
PLASMA ACCELERATION
Electrons
Statistical acceleration of electrons by lower-hybrid turbulence, 8:24806 (J:GB)
Turbulence
Statistical acceleration of electrons by lower-hybrid turbulence, 8:24806 (J:GB)
PLASMA CONFINEMENT
See also INERTIAL CONFINEMENT
Magnetic Field Configurations
Magnetohydrodynamic stability of magnetic slabs, 8:24848 (J:US)
PLASMA DIAGNOSTICS
Diagnostic timing system for the TMX-Upgrade, 8:25170 (J:US)
Atomic Beams
Proposal for time-resolved ion temperature measurements by means of Rutherford scattering of the JET heating beams, 8:24773 (R:NL)
Data Processing
Data processing system for JT-60, 8:25198 (J:US)
Electric Probes
Time-resolved measurements of hydrogen and deuterium fluxes in the ASDEX plasma boundary, 8:24775 (R:US)
Emission Spectra
Spectra of germanium and selenium in the 50-350 A region from the PLT tokamak plasma, 8:24770 (R:US)
Fluorescence
Laser-fluorescence measurements of hydrogen and metal densities in the Doublet III tokamak, 8:24763 (R:US)
Langmuir Probe
Large area pumped limiter experiments in MACROTOR, 8:24852 (J:NL)
Laser Radiation
For the PDX CO/sub 2/ laser experiment. Optical mounts and shutter-window-grating system design, 8:24815 (J:US)
Mass Spectroscopy
Conditioning of ion sources for mass spectrometry of plasmas, 8:24769 (R:US)
Rutherford Scattering
Proposal for time-resolved ion temperature measurements by means of Rutherford scattering of the JET heating beams, 8:24773 (R:NL)
Temperature Measurement
Evaluation of a modified-line-reversal temperature measurement in coal-fired MHD plasmas, 8:23774 (R:US)
Thermography
Infrared thermography of a pump limiter on MACROTOR, 8:24854 (J:NL)
PLASMA HEATING
See also HIGH-FREQUENCY HEATING
Alfven Waves
R.f. system for Alfven wave heating of the TCA tokamak, 8:24926 (J:US)
Alpha Particles
Studies of fusion product confinement and heating in EBT reactors, 8:24813 (J:US)
Ion Waves
Ion heating due to parametrically driven ion wave turbulence, 8:24778 (J:US)
PLASMA OSCILLATIONS
See PLASMA WAVES
PLASMA SHEATH
Time Dependence
Temporal development of a plasma sheath, 8:24805 (J:GB)
PLASMA WAVES
Electromagnetic Radiation
Kinetic analysis of electromagnetic wave backscattering in a magnetized plasma, 8:24808 (J:GB)
PLASTIC PROPERTIES
See PLASTICITY
PLASTICITY
Initiation and development of deformation heterogeneities in superplastic materials, 8:24739 (R:US)
PLASTICS
See also POLYSTYRENE
Additives
Ferromagnetic porous plastics (Japanese patent), 8:24023 (TG:US)

Chemical Properties
Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ:US)
Fabrication
Ferromagnetic porous plastics (Japanese patent), 8:24023 (TG:US)
Manufacturing
Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ:US)
Physical Properties
Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Uses
Ferromagnetic porous plastics (Japanese patent), 8:24023 (TG:US)
Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ:US)

PLATES (FUEL)
See FUEL PLATES

PLATINUM
Biological Effects
Environmental insults to DNA, 8:24413 (RA:US)
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Electric Conductivity
Temperature dependence of electrical resistivity of vanadium, platinum and copper, 8:23978 (J:US)

PLESIOTHERAPY
See RADIOTHERAPY

PLOTTERS
Computer Codes
GRFPAK; plot package for CORTES FEM programs (IBM360,370; FORTRAN IV), 8:24086 (R:US)
PRPLOT; line printer plot subroutine package (IBM370,360; FORTRAN IV), 8:25238 (R:US)

PLT DEVICES
Current-Drive Heating
Lower hybrid heating and current drive on PLT, 8:24766 (R:US)
High-Frequency Heating
High voltage rf coaxial vacuum bushing design considerations, 8:25095 (J:US)
Lower hybrid heating and current drive on PLT, 8:24766 (R:US)
ICR Heating
1.2 megawatt, 800 MHz rf generator for lower hybrid resonance heating, 8:25097 (J:US)
Design of a 9 inch stub tuner for PLT icrh operation, 8:25096 (J:US)
Neutral Atom Beam Injection
Improved plasma generator for the PLT/PDX neutral beam injectors, 8:25113 (J:US)
Neutral Beam Sources
Improved plasma generator for the PLT/PDX neutral beam injectors, 8:25113 (J:US)
Plasma Diagnostics
Spectra of germanium and selenium in the 50-350 A region from the PLT tokamak plasma, 8:24770 (R:US)
RF Systems
Lower hybrid rf monitoring system for PLT, 8:24954 (J:US)

PLUMES
Biological Effects
Improved method for predicting seasonal and annual shadowing from cooling-tower plumes, 8:24401 (R:US)
Environmental Impacts
Improved method for predicting seasonal and annual shadowing from cooling-tower plumes, 8:24401 (R:US)
Environmental Transport
ATM; atmospheric transport & diffusion model (IBM360,370; FORTRAN IV (96%) and BAL (4%)), 8:24227 (R:US)
SULCAL; model of sulfur chemistry in a plume (IBM360,370; FORTRAN IV), 8:24228 (R:US)
Mathematical Models
Common problems in modeling of thermal plumes in air and water, 8:24252 (R:US)
Survey of plume models for atmospheric application, 8:24225 (R:US)

PLUTONIUM
Bioassay
Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R:US)
Complexometry
Behavior of tetravalent plutonium with various ion exchangers in solutions containing nitric acid and oxalates, 8:24053 (TG:US)
Distribution Functions
Behavior of tetravalent plutonium with various ion exchangers in solutions containing nitric acid and oxalates, 8:24053 (TG:US)
Ion Exchange
Behavior of tetravalent plutonium with various ion exchangers in solutions containing nitric acid and oxalates, 8:24053 (TG:US)
Mass Spectroscopy
Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R:US)
Nuclear Materials Management
Operational advanced materials control and accountability system, 8:23198 (J:US)
Purex Process
PUBG; purex solvent extraction process model (IBM3033;CDC CYBER175; FORTRAN IV), 8:23111 (R:US)
Quantitative Chemical Analysis
Selected measurement methods for plutonium and uranium in the nuclear fuel cycle, 8:23197 (R:US)
Radiation Detection
Calibration of phoswich detectors for the in vivo measurement of americium, plutonium and uranium: interlaboratory comparison using the Lawrence Livermore calibration, 8:24733 (RA:US)
Uptake
Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R:US)

PLUTONIUM 238
Radioisotope Heat Sources
Flight-systems safety program, September 1982. Progress report, 8:23202 (R:US)

PLUTONIUM 239
Radionuclide Migration
Comparative behavior of plutonium and americium in the equatorial Pacific, 8:24295 (R:US)
Teratogenesis
Effects of monomeric ^{239}Pu on the fetal rabbit, 8:24394 (J:GB)

PLUTONIUM 240
Radionuclide Migration
Comparative behavior of plutonium and americium in the equatorial Pacific, 8:24295 (R:US)

PLUTONIUM DIOXIDE
Vapor Pressure
Vapor pressures and vapor compositions in equilibrium with hypostoichiometric plutonium dioxide at high temperatures, 8:24001 (R:US)

PLUTONIUM ISOTOPES
See also PLUTONIUM 238
PLUTONIUM 239
PLUTONIUM 240
Quantitative Chemical Analysis
Selected measurement methods for plutonium and uranium in the nuclear fuel cycle, 8:23197 (R:US)

PNA
See POLYCYCLIC AROMATIC HYDROCARBONS

PNL
See BATTELLE PACIFIC NORTHWEST LABORATORIES

POINT MUTATIONS
See GENE MUTATIONS

POLARIZED BEAMS
Meetings
High energy spin physics - 1982, 8:24574 (B:US)

POLARIZED TARGETS
Meetings
High energy spin physics - 1982, 8:24574 (B:US)
POLICY
See ENERGY POLICY
ENVIRONMENTAL POLICY
GOVERNMENT POLICIES
POLLEN
Biological Radiation Effects
Ultraviolet radiation environment of pollen and its effect on pollen germination. Final report, 8:24371 (R:US)
Radiosensitivity
Ultraviolet radiation environment of pollen and its effect on pollen germination. Final report, 8:24371 (R:US)
POLLUTANTS
Not for radioactive contaminants for which use RADIOACTIVE WASTES or other related terminology.
Environmental Transport
ODMOD; soil-water trace-containment transport (IBM360,370; FORTRAN IV (97%) and BAL (3%)), 8:24274 (R:US)
Study of the physical-chemical mechanisms and variables which affect the transport of inorganic and organic microcontaminants in heterogeneous systems. Technical progress report, 1 July 1980-1 July 1983, 8:24279 (R:US)
Indicators
Attempting a forecast on the future occurence of pollutants in food on the basis of today's and future production figures and patterns of application of chemicals, 8:24262 (R:DE:In German)
POLLUTION ABATEMENT
Methods of preventing the occurrence of pollution.
See also AIR POLLUTION ABATEMENT
Research Programs
Advanced environmental control technology (US DOE), 8:22952 (R:US)
POLLUTION CONTROL
Methods of controlling and removing pollution once it has occurred.
See also WATER POLLUTION CONTROL
Manuals
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Research Programs
Advanced environmental control technology (US DOE), 8:22952 (R:US)
POLLUTION CONTROL EQUIPMENT
See also BAGHOUSES
ELECTROSTATIC PRECIPITATORS
Performance Testing
Start-up and performance of a high-sulfur dry-scrubber system, 8:22946 (R:US)
POLOIDAL DIVERTOR EXPERIMENT
See PDX DEVICES
POLOIDAL DIVERTORS
A divertor which takes out poloidal magnetic field lines, forming a separatrix in the poloidal field.
Design
Ripple reduction poloidal field coils for tokamak fusion reactors, 8:24987 (J:US)
U.S. INTOR divertor design, 8:25174 (J:US)
Mathematical Models
Computational study of operating regimes for poloidal divertors, 8:24855 (J:NL)
Models for poloidal divertors, 8:24868 (J:NL)
POLONIUM 210
Radioecological Concentration
Radioactivity in groundwater associated with uranium and phosphate mining and processing, 8:24298 (J:US)
POLYATOMIC MOLECULES
Photoionization
Effects of resonances in molecular photoionization measured with triply differential photoelectron spectroscopy, 8:24519 (R:US)
POLYCYCLIC AROMATIC HYDROCARBONS
Absorption Spectroscopy
Trace element and polycyclic aromatic hydrocarbon levels in sediment cores from Sagamore and Woods Lakes, 8:24288 (RA:US)
Biological Accumulation
Polycyclic aromatic hydrocarbons in Danish leafy crops. Part I: PAH in kale and beets relate to point sources of PAH. Part II: a survey of PAH in commercial grown fresh and deep-frozen kale, 8:24257 (R:US)
Carcinogenesis
Skin carcinogenesis: tumor initiation and promotion, 8:24452 (RA:US)
Chemical Reactions
Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R:US)
Ecological Concentration
Trace element and polycyclic aromatic hydrocarbon levels in sediment cores from Sagamore and Woods Lakes, 8:24288 (RA:US)
Gas Chromatography
Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R:US)
Mass Spectroscopy
Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R:US)
Metabolism
Carcinogen activity in human and rodent cells and tissues, 8:24451 (RA:US)
Sample Preparation
Measurements of POM emissions from coal-fired utility boilers. Final report, 8:22958 (R:US)
Toxicity
Industrial hygiene comprehensive survey. Solvent Refined coal pilot plant, Fort Lewis, Washington - a study of coal liquefaction processes. Final report, 8:24258 (R:US)
POLYENES
Configuration Interaction
Symmetry simplifications of space types in configuration interaction induced by orbital degeneracy, 8:24563 (J:US)
POLYETHYLENES
Crystallization
Effects on processing conditions on the reliability of cross-linked polyethylene-cable insulation. Progress report, 8:24022 (R:US)
Electrical Properties
Effects on processing conditions on the reliability of cross-linked polyethylene-cable insulation. Progress report, 8:24022 (R:US)
POLY(ISOBUTYLENE OXIDE)
See EPOXIDES
POLYMER FLOODING
See MICROEMULSION FLOODING
POLYMERS
See also ELASTOMERS
SILICONES
Dielectric Properties
Development of a fully synthetic tape insulation for lapped power cables, 8:23432 (R:US)
Mechanical Properties
Development of a fully synthetic tape insulation for lapped power cables, 8:23432 (R:US)
POLYNUCLEAR AROMATIC HYDROCARBONS
See POLYCYCLIC AROMATIC HYDROCARBONS
POLYSTYRENE
Structural Chemical Analysis
Small-angle neutron scattering studies of a compatible polymer blend, atactic polystyrene-poly(2,6 dimethyl phenylene oxide), 8:24073 (J:GB)
POLYSULFIDES
See SULFIDES
POLYTHENE
See POLYETHYLENES
POLY(VINYLIDENE FLUORIDE)
See FLUORINATED ALIPHATIC HYDROCARBONS
PONDS
See also SOLAR PONDS
Water Quality
Utilization of surface mine ponds in East Tennessee by breeding amphibians. Final report, 8:24454 (R:US)

POOLS
See PONDS
POOR PEOPLE
See LOW INCOME GROUPS
PORE STRUCTURE
See POROSITY
POROSITY
Pressure Dependence
Deep-burial diagenesis. Annual progress report, 1982-1983, 8:24498 (R:US)
Temperature Dependence
Deep-burial diagenesis. Annual progress report, 1982-1983, 8:24498 (R:US)
POROUS MATERIALS
Gas Flow
Monte Carlo simulation of diffusion of gases in a porous solid: Calculations for a new class of solids, 8:24742 (J:US)
PORPHYRINS
See also CHLOROPHYLL
Photolysis
Electron-transfer reactions of chlorophyll a and porphyrin triplets with radicals in aqueous micellar solutions, 8:23283 (J:US)
PORPOISES
See CETACEANS
PORTUGAL
Energy Policy
Argonne Energy Model - Portugal, 8:23692 (R:US)
POSITRON CHANNELING
Photon Emission
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
POSITRON COMPUTED TOMOGRAPHY
Equipment
Detectors, sampling, shielding, and electronics for positron emission tomography, 8:24342 (R:US)
Scintillation Counters
Facility for positron computed tomography, 8:24347 (P:DE:In German)
POSITRONS
Annihilation
Characterization of defects in metals by positron-annihilation spectroscopy, 8:23953 (R:US)
POTABLE WATER
See DRINKING WATER
POTASSIUM
Catalytic Effects
Comparison of iron Fischer-Tropsch catalysts using on-line gas chromatography, 8:23219 (R:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
POTASSIUM 43
Decay
^{43}K, a new probe for the system KFe, 8:24665 (RA:DE:In German)
POTASSIUM BROMIDES
Physical Radiation Effects
Color-center production and lattice expansion in KBr by x-irradiation near room temperature, 8:24076 (R:US)
POTASSIUM CHLORIDES
Crystal Defects
Charge transfer complexes of molecular oxygen in $NaClO_3$ and $KClO_3$ studied by resonance Raman and infrared spectroscopy, 8:24061 (J:US)
Photolysis
Charge transfer complexes of molecular oxygen in $NaClO_3$ and $KClO_3$ studied by resonance Raman and infrared spectroscopy, 8:24061 (J:US)
POTASSIUM COMPOUNDS
See also POTASSIUM BROMIDES
POTASSIUM CHLORIDES
POTASSIUM SULFIDES
Phonons
Raman measurements of folded interlayer shearing phonons in KC_{12}/sub n/ (n = 2 approx. 6), 8:24032 (R:US)
POTASSIUM IONS
Electron-Ion Collisions
Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence, 8:24554 (J:US)
POTASSIUM SULFIDES
Thermodynamic Properties
Provisional values for the thermodynamic properties of potassium sulfide, 8:23776 (R:US)
POTENTIAL FLOW
Computer Codes
TRUMP; transient & steady state temperature distribution (IBM360,370;CDC7600; FORTRAN IV (95%) and BAL (5%) (IBM); FORTRAN IV (CDC)), 8:24135 (R:US)
POTOMAC RIVER
Nutrients
Biogeochemistry of trace metals in Chesapeake Bay. Final report, April 1, 1981-March 31, 1982, 8:24278 (R:US)
POWER AMPLIFIERS
Power Factor
Poloidal-field thyristor amplifier with improved power factor, for TEXTOR, 8:25062 (J:US)
POWER DEMAND
Forecasting
1981 commercial and industrial survey: customers of municipal and cooperative distributors of TVA power, 8:23752 (R:US)
Regional analysis of potential impacts of electric and hybrid vehicles on electric utilities, 8:23729 (R:US)
POWER GENERATION
See also COGENERATION
Forecasting
EIA symposium on short-term energy forecasting. Summary of the proceedings, 8:23721 (R:US)
POWER PLANTS
See also DUAL-PURPOSE POWER PLANTS
FUEL CELL POWER PLANTS
GAS TURBINE POWER PLANTS
HYDROELECTRIC POWER PLANTS
MHD POWER PLANTS
SOLAR POWER PLANTS
THERMAL POWER PLANTS
THERMONUCLEAR POWER PLANTS
WIND POWER PLANTS
Availability
R and D benefits assessment - a regional approach, 8:23746 (R:US)
Capitalized Cost
Analysis of power-plant-construction lead times. Volume 1. Analysis and results, 8:23419 (R:US)
Construction
Analysis of power-plant-construction lead times. Volume 1. Analysis and results, 8:23419 (R:US)
Electric Power Plant International, 8:23421 (R:US)
Economic Analysis
Economies of scale in electrical generating plants, 8:23751 (RA:US)
R and D benefits assessment - a regional approach, 8:23746 (R:US)
Economics
RATEPAC; power plant revenue requirements code (IBM303x,360,370; FORTRAN IV), 8:23405 (R:US)
Fire Prevention
Fire tests in ventilated rooms: detection of cable-tray and exposure fires, 8:23420 (R:US)
Life-Cycle Cost
BICYCLE; levelized life cycle cost calculation (CDC6600,CYBER175; FORTRAN IV), 8:23404 (R:US)
Operating Cost
PRODCOST; utility generating cost simulation (IBM360,370,303x; FORTRAN IV (97%) and Assembler (3%)), 8:23403 (R:US)
Size
Economies of scale in electrical generating plants, 8:23751 (RA:US)
Stirling Engines
Development of a quiet Stirling cycle multi-fuel engine for electric power generation. Final report Feb-Aug 82, 8:23397 (R:US)

Technology Assessment
Electric Power Plant International, 8:23421 (R:US)
Energy technology data handbook. Vol. 1, 8:23423 (R:DE)

POWER POOLS
See INTERCONNECTED POWER SYSTEMS

POWER REACTORS
See also ARKANSAS-2 REACTOR
BYRON-1 REACTOR
BYRON-2 REACTOR
CALHOUN-1 REACTOR
CALVERT CLIFFS-1 REACTOR
CALVERT CLIFFS-2 REACTOR
CLINCH RIVER BREEDER REACTOR
COMANCHE PEAK-1 REACTOR
COMANCHE PEAK-2 REACTOR
DRESDEN-2 REACTOR
ENRICO FERMI-1 REACTOR
FESSENHEIM-1 REACTOR
FESSENHEIM-2 REACTOR
GINNA-1 REACTOR
INDIAN POINT-3 REACTOR
MC GUIRE-1 REACTOR
MC GUIRE-2 REACTOR
MILLSTONE-1 REACTOR
MILLSTONE-2 REACTOR
OCONEE-1 REACTOR
PALO VERDE-1 REACTOR
PALO VERDE-2 REACTOR
PALO VERDE-3 REACTOR
ROBINSON-2 REACTOR
SEABROOK-1 REACTOR
SEABROOK-2 REACTOR
SHIPPINGPORT REACTOR
THREE MILE ISLAND-2 REACTOR
WATERFORD-3 REACTOR

Data Compilation
Nuclear reactors built, being built, or planned in the Unites States as of June 30, 1981, 8:23443 (R:US)

Reactor Components
Reactor-safety research programs. Quarterly report, July-September 1982, 8:23549 (R:US)

Reactor Kinetics
Reactor-safety research programs. Quarterly report, July-September 1982, 8:23549 (R:US)

Reactor Materials
Reactor-safety research programs. Quarterly report, July-September 1982, 8:23549 (R:US)

POWER SUPPLIES
See also PHOTOVOLTAIC POWER SUPPLIES
SPACECRAFT POWER SUPPLIES
INTOR power handling and conversion, 8:25071 (J:US)
Optically insulated power supply for high voltage instruments, 8:25073 (J:US)

Design
10 kA pulsed power supply for superconducting coils, 8:25070 (J:US)
10-kA pulsed power supply for superconducting coils, 8:24821 (R:US)
Design, fabrication and erection of flywheel-generator-convertors for the JET tokamak, 8:25060 (J:US)
Power supplies for the Varennes tokamak a quasi-continuous operation experiment, 8:25065 (J:US)

Electrical Testing
2.0 MVA voltage doubler power supply for capacitor bank charging, 8:25068 (J:US)
Commissioning tests for the TEXTOR toroidal field power supply system, 8:25063 (J:US)
Development of a high voltage crowbar, 8:25066 (J:US)

Interlocks
CAMAC-based interlock system for power supply hardware protection on MFTF, 8:25188 (J:US)

Operation
TEXT poloidal field power systems operation, 8:25026 (J:US)
TEXT toroidal field power supply operation, 8:25027 (J:US)

POWER SYSTEMS
Includes electric power networks with associated generating and transmission facilities.
See also DC SYSTEMS
INTERCONNECTED POWER SYSTEMS
RANKINE CYCLE POWER SYSTEMS

Electrical Equipment
Investigation of the interaction between the power electronic circuit and power supply systems, 8:23431 (R:DE:In German)

Interference
Electrical system waveform distortion, 8:23822 (RA:US)

Operating Cost
Comparison of algorithms for computing generating-system reliability indexes. Final report, 8:23745 (R:US)

Optimization
STOPS; power system short-term optimization (IBM303x,360,370; FORTRAN IV), 8:23402 (R:US)

Power Factor
Investigation of the interaction between the power electronic circuit and power supply systems, 8:23431 (R:DE:In German)

Reliability
Comparison of algorithms for computing generating-system reliability indexes. Final report, 8:23745 (R:US)

POWER TRANSMISSION LINES

Data Acquisition Systems
Use of computers for the documentation of supply lines, 8:23430 (R:DE:In German)

Environmental Impact Statements
Transmisson-Facilities Vegetation-Management Program: Bonneville Power Administration. Draft environmental impact statement, 8:24309 (R:US)

POWER TRANSMISSION TOWERS

Foundations
Transmission-line structure foundations for uplift-compression loading. Final report, 8:23437 (R:US)

POWERED SUPPORTS

Specifications
Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls, 8:22978 (R:US)

PRECIPITATION
In chemical processes only; see also ATMOSPHERIC PRECIPITATIONS and CHARGED-PARTICLE PRECIPITATION.

Particle Size
Ostwald ripening of precipitates and irreversible phenomena, 8:24056 (R:US)

Thermodynamics
Ostwald ripening of precipitates and irreversible phenomena, 8:24056 (R:US)

PRECIPITATIONS (ATMOSPHERIC)
See ATMOSPHERIC PRECIPITATIONS

PREFABRICATED BUILDINGS

Solar Water Heating
Measuring program for hot water supply in prefabricated houses using solar energy, 8:23313 (R:DE:In German)

PRESSURE TUBES

Materials Testing
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)

PRESSURE VESSELS

Bellows
Fatigue testing of TFTR vacuum vessel bellows, 8:25160 (J:US)

Crack Propagation
Investigation of fatigue crack growth in a 288°C PWR water environment by a constant ΔK test method, 8:23906 (RA:US)

Fatigue
Investigation of fatigue crack growth in a 288°C PWR water environment by a constant ΔK test method, 8:23906 (RA:US)

Leak Testing
Leak detection inside a vacuum vessel, 8:25208 (J:US)

Mechanical Properties
Mechanical response of cavity tube banks in heavy ion beam fusion reactors, 8:25204 (J:US)

Mechanical Vibrations
Analysis of ambient vibrational motion of MFTF-A vessel/magnet structure, 8:24839 (R:US)

Physical Radiation Effects
Effect of neutron irradiation on dynamic fracture toughness of A533 Grade B Class 1 pressure vessel steel , 8:23919 (RA:US)
Temperature Effects
Thermomechanical behavior of refractory concrete linings, 8:22939 (J:US)
PRESSURIZED WATER COOLED MODERATED REACTOR
See PWR TYPE REACTORS
PRESSURIZED WATER REACTORS
See PWRTYPE REACTORS
PRESTRESSED CONCRETE
Stress Analysis
NONSAP-C; nonlinear stress concrete structures (CDC7600; FORTRAN IV (CDC FORTRAN Extended)), 8:24026 (R:US)
PREVENTION OF SIGNIFICANT DETERIORATION
Economic Analysis
Simplified approaches to protecting PSD Class I areas. Final report, 8:24302 (R:US)
PRICES
Prior to June 1979, CHARGES was used.
See also MARGINAL-COST PRICING
Forecasting
Short-Term Energy Outlook. Volume 2. Methodology, 8:23713 (R:US)
PRICING REGULATIONS
Legal Aspects
Alleged improprieties concerning the settlement of overcharge violations against the Tauber Oil Company, 8:23043 (R:US)
PRINCETON LARGE TORUS
See PLT DEVICES
PROCESS HEAT REACTORS
Commercialization
HTGR applications program. Semiannual report for the period October 1, 1980-March 31, 1981, 8:23538 (R:US)
Specifications
HTGR applications program. Semiannual report for the period October 1, 1980-March 31, 1981, 8:23538 (R:US)
PROCESSING (DATA)
See DATA PROCESSING
PROCESSING (ORES)
See ORE PROCESSING
PROCUREMENT
Economy
Excessive costs incurred by the Strategic Petroleum Reserve program for rental and other services, 8:23722 (R:US)
PRODUCTION
Monthly energy review, 8:23032 (R:US)
PRODUCTION (HYDROGEN)
See HYDROGEN PRODUCTION
PRODUCTIVITY
Response Modifying Factors
Overview of boom towns and construction efficiency interactions, 8:23697 (R:US)
PROGRAM MANAGEMENT
See also CONTRACT MANAGEMENT
Adjustments
Five-megawatt geothermal-power pilot-plant project, 8:23375 (R:US)
Audits
Management of the ten-megawatt solar-thermal central-receiver pilot-plant project, 8:23302 (R:US)
Management of furniture at Department of Energy headquarters locations, 8:25228 (R:US)
Project management in the oil shale program, 8:23078 (R:US)
Weatherization program in West Virginia, 8:23812 (R:US)
Contractor Personnel
Project management in the oil shale program, 8:23078 (R:US)
Financial Data
Financial management in the oil-shale program, 8:23080 (R:US)
Government Policies
Five-megawatt geothermal-power pilot-plant project, 8:23375 (R:US)
Information Dissemination
Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study, 8:23727 (R:US)
Recommendations
Receipt and use of half-fare airline coupons at selected Department of Energy field locations, 8:25229 (R:US)
PROGRAMMING
Limited to computer programming.
SOFTWARE TOOLS; program development interface (Base version (This version is not tailored to any one machine but serves as a portable base for the user who can add "primitives" or modify the base source to tailor SOFTWARE TOOLS to the local computing environment.); FORTRAN IV and RATFOR), 8:25258 (R:US)
Documentation
Issues in defining standards for documentation, 8:25267 (R:US)
PROJECT MANAGEMENT
See PROGRAM MANAGEMENT
PROJECTILES
Aerodynamics
Analytical and experimental evaluation of a proposed self-forging fragment munition, 8:24216 (R:US)
Chemical Explosives
Study of premature explosions in artillery projectiles filled with Composition-B. Final report, 8:24217 (R:US)
Configuration
Analytical and experimental evaluation of a proposed self-forging fragment munition, 8:24216 (R:US)
PROJECTION SPARK CHAMBERS
Performance
Performance of a high-pressure-hydrogen time-projection chamber, 8:24196 (R:US)
PROMETHIUM 147
Inventories
Byproduct inventories, 8:23171 (R:US)
PROPANE
Oxidation
Yield of the oxidation of very rarefied propane/air mixtures in catalytic fluidized beds, 8:24571 (R:DE:In German)
1-PROPANOL
See PROPANOLS
2-PROPANOL
See PROPANOLS
PROPANOLS
Solvent Properties
Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R:US)
PROPELLANTS
Fracture Properties
High-energy propellant studies: introduction and overview, 8:24215 (R:US)
Stability
High-energy propellant studies: introduction and overview, 8:24215 (R:US)
PROPERTY MANAGEMENT
Administrative Procedures
Management of furniture at Department of Energy headquarters locations, 8:25228 (R:US)
PROPORTIONAL COUNTERS
See also HE-3 COUNTERS
Position Sensitive Detectors
Two-dimensional position-sensitive parallel-plate avalanche counter for the magnetic spectrometer, 8:24200 (RA:DE:In German)
PROPYL ALCOHOLS
See PROPANOLS
PROTAMINES
Alkylation
Chemical dosimetry studies in mammalian germ cells, 8:24432 (RA:US)
PROTECTION
See SAFETY
PROTECTION (RADIATION)
See RADIATION PROTECTION
PROTEINS
See also METALLOTHIONEIN
PEPTIDES
PROTAMINES

Luminescence
Protein luminescence: the end of the beginning, 8:24319 (RA:US)

PROTON REACTIONS
Capture
Theoretical nuclear reaction and structure studies using kaons and photons. Progress report, 1 February 1982-31 January 1983, 8:24641 (R:US)
Spallation
Mass-yield distribution in proton and heavy-ion induced target fragmentation processes, 8:24691 (RA:DE:In German, English)

PROTON SPECTROMETERS
Magnetic Spectrometers
Los Alamos Meson Physics Facility high-resolution-spectrometer dipole magnets: a summary report, 8:24184 (R:US)

PROTON-ANTIPROTON INTERACTIONS
Experiment Planning
Searching for structure in nucleon-antinucleon interactions near threshold, 8:24592 (RA:US)

PROTON-DEUTERON INTERACTIONS
Particle Production
Relation between $d\sigma$ ($p + d \rightarrow {}^3He + \gamma$) and $d\sigma$ ($p + d \rightarrow {}^3He + \pi^0$) at intermediate energy based on isobar dominance, 8:24611 (RA:US)

PROTON-PROTON INTERACTIONS
Elastic Scattering
Polarization structure of reactions at theta/sub C.M./ = $\pi/2$, 8:24637 (R:US)
Pair Production
Production mechanisms of high mass muon pairs. Technical report number 117, 8:24576 (R:US)
Scattering Amplitudes
Polarization structure of reactions at theta/sub C.M./ = $\pi/2$, 8:24637 (R:US)

PROTONS
Energy Losses
Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R:US)
LET
Secondary electron spectra in the trace of fast ions travelling through water vapor, 8:24738 (R:DE:In German)
Radiation Doses
Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R:US)
Structure Functions
Internal spin structure of the proton from high energy polarized e-p scattering, 8:24593 (RA:US)

PROTOPLASTS
See PLANT CELLS

PSD
See PREVENTION OF SIGNIFICANT DETERIORATION

PSI RESONANCES
Radiative Decay
Quantum chromodynamics and the helicity structure of psi→γ2^{++}, 8:24629 (J:US)

PTERIDINES
Biosynthesis
Enzyme and gene regulation in Drosophila, 8:24412 (RA:US)

PTERINS
See PTERIDINES

PUBLIC BUILDINGS
Energy Conservation
Assessment of state plans for Title III of the National Energy Conservation Policy Act (NECPA), 8:23706 (R:US)
Energy Consumption
Energy use guidelines for public/nonprofit buildings, 8:23829 (J:US)
Indoor Air Pollution
Odor acceptability in the indoor environment. Paper 81.22.3, 8:23833 (J:US)
Ventilation
Odor acceptability in the indoor environment. Paper 81.22.3, 8:23833 (J:US)

PUBLIC HEALTH
Emergency Plans
In-plant considerations for optimal offsite response to reactor accidents, 8:23574 (R:US)

PUBLIC UTILITIES
See also ELECTRIC UTILITIES
WATER UTILITIES
Diversification
Report of the Ad Hoc Committee on utility diversification. Revised draft report, 8:23720 (R:US)
Regulations
Report of the Ad Hoc Committee on utility diversification. Revised draft report, 8:23720 (R:US)

PUERTO RICO
Ocean Thermal Power Plants
OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J:US)

PULMONARY CANCER
See CARCINOMAS

PULMONARY LAVAGE
See LUNGS

PULSE ANALYZERS
Remote Control
Improved stabilization scheme for computerized pulse-height analyzers, 8:24205 (J:NL)

PULSE GENERATORS
See also HIGH-VOLTAGE PULSE GENERATORS
Computerized Control Systems
Digitally controlled twelve-pulse firing generator, 8:25187 (J:US)

PULSED MHD GENERATORS
Performance
High power pulsed plasma MHD experiments. Annual report 1 Jan 81-30 Sep 82, 8:23763 (R:US)

PULSED REACTORS
Rod Drop Accidents
A method for analysis of reactivity insertion accidents in transient reactors, 8:23570 (J:US)

PULVERIZED FUEL ASH
See FLY ASH

PUMPED STORAGE POWER PLANTS
Optimization
STOPS; power system short-term optimization (IBM303x,360,370; FORTRAN IV), 8:23402 (R:US)

PUMPS
See also VACUUM PUMPS
WATER PUMPS
Economic Analysis
Economics of Cherepnov water lifter for low-head hydropower, 8:23244 (R:US)
Operating Cost
Costs and indexes for domestic oil- and gas field equipment and production operations, 1982, 8:23017 (R:US)
Operation
Electrohydrodynamic pumping in cable pipes. Final report, 8:23435 (R:US)
Packings
EDS-coal-liquefaction process development. Phase IV. Construction of Exxon Coal-Liquefaction Pilot Plant. Final report (Viton, Kalrez; temperature effects), 8:22919 (R:US)
Performance
Electrohydrodynamic pumping in cable pipes. Final report, 8:23435 (R:US)
Theoretical and experimental investigation of the Cherepnov water lifter, 8:23243 (R:US)
Seals
EDS-coal-liquefaction process development. Phase IV. Construction of Exxon Coal-Liquefaction Pilot Plant. Final report (Viton, Kalrez; temperature effects), 8:22919 (R:US)
Technology Assessment
Theoretical and experimental investigation of the Cherepnov water lifter, 8:23243 (R:US)

PUREX PROCESS
Environmental Impacts
Addendum to Environmental Impact Statement. Operation of PUREX and Uranium Oxide Plant Facilities, 8:24308 (R:US)

PURITY
See IMPURITIES

PWR TYPE REACTORS
See also ARKANSAS-2 REACTOR
BYRON-1 REACTOR
BYRON-2 REACTOR
CALHOUN-1 REACTOR
CALVERT CLIFFS-1 REACTOR
CALVERT CLIFFS-2 REACTOR
COMANCHE PEAK-1 REACTOR
COMANCHE PEAK-2 REACTOR
FESSENHEIM-1 REACTOR
GINNA-1 REACTOR
INDIAN POINT-3 REACTOR
MC GUIRE-1 REACTOR
MC GUIRE-2 REACTOR
MILLSTONE-2 REACTOR
OCONEE-1 REACTOR
PALO VERDE-1 REACTOR
PALO VERDE-2 REACTOR
PALO VERDE-3 REACTOR
ROBINSON-2 REACTOR
SEABROOK-1 REACTOR
SEABROOK-2 REACTOR
SHIPPINGPORT REACTOR
THREE MILE ISLAND-2 REACTOR
WATERFORD-3 REACTOR

Annular Fuel Elements
Development of an extended burnup fuel assembly, 8:23488 (RA:US)

Burnup
Operating experience with combustion engineering fuel at high burnups, 8:23474 (RA:US)

Containment Buildings
Scale modeling of turbine-missile impact into concrete. Final report, 8:23611 (R:US)
Windfield and trajectory models for tornado-propelled objects. Final report, 8:23614 (R:US)

Containment Systems
COMPARE/MOD1A; transient flow with sinks & doors (CDC7600,CYBER175; FORTRAN IV), 8:23468 (R:US)
CONTEMPT4/MOD2; multicompartment containment (CDC7600; FORTRAN IV (96%) and COMPASS (4%)), 8:23584 (R:US)

Design
Towards intrinsically safe light-water reactors, 8:23637 (R:US)

Emergency Plans
In-plant considerations for optimal offsite response to reactor accidents, 8:23574 (R:US)

Fuel Assemblies
Design and development of KWU 18 x 18 PWR and 9 x 9 BWR fuel assemblies and their relevance to burnup increase, 8:23459 (RA:US)
Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982, 8:23473 (R:US)
Development of an extended burnup fuel assembly, 8:23488 (RA:US)

Fuel Cans
Observations and analyses of the corrosion behavior of PWR fuel, 8:23487 (RA:US)
Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours, 8:23920 (RA:US)

Fuel Cycle
Economics of extended burnup from a utility point of view, 8:23532 (RA:US)
Extended burnup implementation: assessment and experience, 8:23491 (RA:US)
Isotope correlations for safeguards surveillance and accountancy methods, 8:23190 (R:US)
Projected national and world benefits to the LWR fuel cycle from extended burnup, 8:23533 (RA:US)

Fuel Management
Burnable poisons for extended burnup fuel management: present and future, 8:23492 (RA:US)
Economics of extended burnup from a utility point of view, 8:23532 (RA:US)
Fuel management schemes for PWR extended burnup fuel cycles with gadolinium, 8:23493 (RA:US)

Fuel Pellets
Duplex fuel: British and Danish experience and evaluation, 8:23489 (RA:US)

Fuel Rods
Burnable poisons for extended burnup fuel management: present and future, 8:23492 (RA:US)
Comparison of COMETHE-IIIJ and FCODE-BETA fission gas-release predictions with measurements. Final report, 8:23466 (R:US)
Densification, swelling, and microstructures of LWR fuels through extended burnups, 8:23485 (RA:US)
Duplex fuel: British and Danish experience and evaluation, 8:23489 (RA:US)
Economics of extended burnup from a utility point of view, 8:23532 (RA:US)
EPRI/B and W cooperative program on PWR fuel-rod performance. Final report, 8:23498 (R:US)
Evaluation of published high burnup fission gas release data, 8:23456 (RA:US)
Extended burnup implementation: assessment and experience, 8:23491 (RA:US)
Fission gas release from PWR fuel rods under conditions of normal operation and power ramping, 8:23481 (RA:US)
Fission gas release at high burnup, 8:23482 (RA:US)
Fission gas release from fuel rods irradiated in US commercial light water reactors, 8:23457 (RA:US)
French analytical experience on high burnup performance of PWR fuel elements under steady-state conditions, 8:23486 (RA:US)
Fuel management schemes for PWR extended burnup fuel cycles with gadolinium, 8:23493 (RA:US)
Fuel performance characteristics at extended burnup, 8:23475 (RA:US)
Fuel performance experience of high burnup fuel in RWE reactors, 8:23480 (RA:US)
High burnup performance of BN fuels in LWR's, 8:23453 (RA:US)
High burnup effects on the pellet-cladding interaction phenomenon, 8:23484 (RA:US)
International over-ramp project at Studsvik, 8:23483 (RA:US)
KWU experience and analysis of LWR fuel with respect to high burnup, 8:23450 (RA:US)
LOCA analysis of annular fuel pellet design for extended burnup, 8:23606 (RA:US)
LWR extended burnup: fuel performance and utilization, 8:23448 (R:US)
LWR extended burnup: fuel performance and utilization, 8:23458 (R:US)
Observations and analyses of the corrosion behavior of PWR fuel, 8:23487 (RA:US)
Projected national and world benefits to the LWR fuel cycle from extended burnup, 8:23533 (RA:US)
PWR high burnup licensing assessment, 8:23490 (RA:US)
Regulatory perspective on extended burnup fuel, 8:23522 (RA:US)
Risoe Fission Gas Project: an overview, 8:23462 (RA:US)
Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel, 8:23463 (RA:US)

Fuel-Cladding Interactions
High burnup effects on the pellet-cladding interaction phenomenon, 8:23484 (RA:US)

Ice Condensers
Hydrogen combustion during degraded core accidents in PWR ice condenser plants, 8:23655 (J:US)

In-Service Inspection
Nondestructive evaluation program: progress in 1982, 8:23464 (R:US)

Legal Aspects
Operating reactors licensing actions summary, 8:23527 (R:US)

Loss of Coolant
Analysis of the BCL transient ECC bypass test with the TRAC-PD2/MOD1 code, 8:23652 (J:US)
Application of a honeycomb insulator design in a variable high-temperature, high-pressure environment, 8:23658 (J:US)

CONTEMPT4/MOD2; multicompartment containment (CDC7600; FORTRAN IV (96%) and COMPASS (4%)), 8:23584 (R:US)
Hydrogen combustion during degraded core accidents in PWR ice condenser plants, 8:23655 (J:US)
LOCA analysis of annular fuel pellet design for extended burnup, 8:23606 (RA:US)
REFLUX; LWR reflood heat transfer prediction (IBM360; FORTRAN IV), 8:23445 (R:US)
Thermal and mechanical behaviour of PWR fuel rod simulators for LOCA-experiments, 8:23619 (R:DE)
TRAC-PD2/MOD1; best-estimate analysis PWR LOCA (CDC7600; FORTRAN IV (FTN 4.5 FORTRAN compiler) with selected COMPASS replacement routines), 8:23585 (R:US)

Loss of Flow
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
Scaling criteria for LWR's under single-phase and two-phase natural circulation, 8:23603 (R:US)

Nuclear Models
Three-dimensional modeling of thermal and fluid mixing in PWRs during high-pressure coolant injection, 8:23640 (J:US)

Pressure Vessels
Investigation of fatigue crack growth in a 288°C PWR water environment by a constant ΔK test method, 8:23906 (RA:US)

Reactor Accidents
Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior, 8:23601 (R:US)
RELAP5 assessment: FLECHT SEASET steam-generator test 23402, 8:23632 (R:US)

Reactor Components
Fracture toughness of PWR-components supports, 8:23505 (R:US)

Reactor Control Systems
Using cognitive modeling to improve the man-machine interface, 8:23561 (RA:US)

Reactor Cooling Systems
Liquid level sensing device, 8:23506 (P:US)

Reactor Core Disruption
Hydrogen combustion during degraded core accidents in PWR ice condenser plants, 8:23655 (J:US)

Reactor Decommissioning
Funding nuclear-power-plant decommissioning. Final report, 8:23536 (R:US)

Reactor Instrumentation
Development of an improved-contact liquid-level probe for pressurized reactor vessels, 8:23495 (R:US)

Reactor Licensing
PWR high burnup licensing assessment, 8:23490 (RA:US)
Regulatory licensing status summary report. Nuclear power plants data for decisions (blue book), February 1-February 28, 1983, 8:23526 (R:US)

Reactor Maintenance
Cleaning steam generators off-line (soaking) with chelants. Final report, 8:23497 (R:US)

Reactor Materials
Fracture toughness of PWR-components supports, 8:23505 (R:US)
Plant Materials Program: progress June 1981-May 1982, 8:23465 (R:US)

Reactor Operation
Licensed operating reactors. Status summary report data as of October 31, 1982, 8:23523 (R:US)
Operating reactors licensing actions summary, 8:23527 (R:US)
Regulatory perspective on extended burnup fuel, 8:23522 (RA:US)

Reactor Safety
Organization and structure of an EPRI DATATRAN data bank, 8:23613 (R:US)
Safety-Evaluation Report related to the D2/D3 steam-generator design modification, 8:23624 (R:US)
Selected review and evaluation of US safety research vis-a-vis foreign safety research for nuclear power plants, 8:23636 (R:US)
Towards intrinsically safe light-water reactors, 8:23637 (R:US)

Reactor Shutdown
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)

Spent Fuel Elements
Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel, 8:23463 (RA:US)

Steam Generators
Cleaning steam generators off-line (soaking) with chelants. Final report, 8:23497 (R:US)
Flow-induced vibration of a curved tube array subject to liquid cross flow, 8:23469 (R:US)
Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior, 8:23601 (R:US)
Safety-Evaluation Report related to the D2/D3 steam-generator design modification, 8:23624 (R:US)
Thermal and hydraulic code verification: ATHOS2 and model boiler No. 2 data. Volume 3. Final report, 8:23503 (R:US)
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report, 8:23502 (R:US)
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report, 8:23501 (R:US)
Thermal-hydraulic code qualification: ATHOS2 and data from Bugey 4 and Tricastin 1. Final report, 8:23499 (R:US)

Steam Turbines
Scale modeling of turbine-missile impact into concrete. Final report, 8:23611 (R:US)

Transients
International over-ramp project at Studsvik, 8:23483 (RA:US)
PWR systems transient analysis: a reactor-safety perspective, 8:23600 (R:US)

PYRENE

Mutagen Screening
Mammalian cell genetic toxicology, 8:24416 (RA:US)

Photolysis
Electron-transfer reactions of chlorophyll a and porphyrin triplets with radicals in aqueous micellar solutions, 8:23283 (J:US)

PYRITE

Dielectric Properties
Selective magnetic enhancement of pyrite in coal by dielectric heating, 8:22991 (R:US)

Differential Thermal Analysis
Selective magnetic enhancement of pyrite in coal by dielectric heating, 8:22991 (R:US)

Magnetic Susceptibility
Selective magnetic enhancement of pyrite in coal by dielectric heating, 8:22991 (R:US)

Removal
Selective magnetic enhancement of pyrite in coal by dielectric heating, 8:22991 (R:US)

PYRITES
See PYRITE

PYROLYSIS
See also FLASH HYDROPYROLYSIS PROCESS

Bibliographies
Bibliography coal pyrolysis 1980-1981, 8:22910 (RA:CA)

Comparative Evaluations
The flash pyrolysis and hydropyrolysis of coal, 8:22901 (RA:CA)

Meetings
Application of pyrolysis technology to the utilization of eastern Canadian coals, 8:22900 (R:CA)

PYROLYSIS PRODUCTS
See also CHARS

Hydrogenation
Hydrodeoxygenation of phenolic components of wood-derived oil, 8:23279 (R:US)

Market
Opportunities for pyrolysis technology in producing gas and combustible residues for use in electric power generation, 8:22909 (RA:CA)

PYRROLES

Electrochemistry
Electropolymerization of pyrrole in the presence of fluoborate, 8:24075 (J:US)

Polymerization
Electropolymerization of pyrrole in the presence of fluoborate, 8:24075 (J:US)

Q

QUADRUPOLE LINACS
Beam Bunching
Use of the radio-frequency quadrupole structure as a cyclotron axial-buncher system, 8:24168 (R:US)
QUANTUM CHROMODYNAMICS
Helicity
Quantum chromodynamics and the helicity structure of psi--$\gamma 2^{++}$, 8:24629 (J:US)
QUANTUM MECHANICS
Three-Body Problem
Particle-two particle interaction in configuration space, 8:24748 (R:DE)
Test of three-body separable pole expansions at negative and positive energies, 8:24749 (R:DE)
QUARK CONFINEMENT
See BAG MODEL
QUARK MODEL
See also BAG MODEL
Reviews
Successes and failures of the constituent quark model, 8:24605 (R:US)
QUARK-ANTIQUARK INTERACTIONS
Potentials
Three strange quark system, 8:24614 (RA:US)
QUARK-QUARK INTERACTIONS
Potentials
Three strange quark system, 8:24614 (RA:US)
QUARKS
Configuration Mixing
Perspectives on weak interactions, 8:24579 (RA:US)
QUARTZ
Luminescence
Spectral and spatial studies of shock-induced luminescence from quartz, 8:24007 (R:US)
Sorptive Properties
Studies of molecular adsorbates at interfaces by optical second-harmonic generation (p-nitrobenzoic acid), 8:24069 (R:US)
QUINOLINES
Genetic Effects
Induction of chromosome aberrations, sister chromatid exchanges and specific locus mutations by radiation and chemicals, and the application of the studies to population monitoring and risk estimation, 8:24376 (RA:US)

R

RACKS (FUEL)
See FUEL RACKS
RADIATION ACCIDENTS
Reviews
Search of the Russian scientific literature for the descriptions of the medical consequences of the Kyshtym accident, 8:23188 (R:US)
RADIATION HYGIENE
See RADIATION PROTECTION
RADIATION MONITORING
On-Line Measurement Systems
On-line, real-time measurements of decontamination factors for a low-level waste incinerator, 8:23179 (J:NL)
Quality Assurance
The Eastern Environmental Radiation Facility's participation in interlaboratory and intralaboratory comparisons of environmental sample analyses: 1979 and 1980. Final report, 8:24265 (R:US)
RADIATION MONITORS
Design
Vehicle monitors for domestic perimeter safeguards, 8:23192 (R:US)
Performance
Vehicle monitors for domestic perimeter safeguards, 8:23192 (R:US)
RADIATION PROTECTION
Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R:US)
RADIATION SAFETY
See RADIATION PROTECTION
RADIATION TRANSPORT
See also CHARGED-PARTICLE TRANSPORT
Computer Calculations
Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants, 8:24726 (R:US)
RADIATORS
Limited to heat radiators.
Emplacement
Insulation of exterior walls, placement of radiators and room climate, 8:23798 (R:DE:In German)
RADICALS
Not to be used for compound descriptions.
See also METHYLENE RADICALS
PHENYLENE RADICALS
Laser Spectroscopy
Infrared absorption spectroscopy with color-center lasers. Progress report, April 1 1982-February 15, 1983 (C_2H), 8:24081 (R:US)
RADIOACTIVE AEROSOLS
Air Pollution Control
Mechanical-reliability evaluation of a proposed emergency-response radioiodine air sampler, 8:24249 (R:US)
Filtration
Particle size for greatest penetration of HEPA filters - and their true efficiency, 8:24244 (R:US)
Radiation Monitoring
Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R:US)
Radioactivity Transport
MAEROS user manual (LMFBR), 8:23627 (R:US)
Test Facilities
Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5 (LMFBR), 8:23617 (R:US)
RADIOACTIVE BIOLOGICAL WASTES
See RADIOACTIVE WASTES
RADIOACTIVE EFFLUENTS
Environmental Exposure Pathway
LADTAP2; liquid pathway dose calculations (IBM360,370,303x;CDC7600,CYBER175; FORTRAN IV), 8:24293 (R:US)
Meteorology
XOQDOQ; nuclear power plant effluent releases (IBM370,303x; FORTRAN IV), 8:23572 (R:US)
Radionuclide Migration
GASPAR; evaluation of atmospheric releases (IBM370,303x; FORTRAN IV (98%) and Assembly language (2%)), 8:24248 (R:US)
RADIOACTIVE GASEOUS WASTES
See GASEOUS WASTES
RADIOACTIVE WASTES
RADIOACTIVE MATERIALS
See also RADIOACTIVE WASTES
Transport
RADTRAN II user guide, 8:23117 (R:US)
Sewage Solids Irradiator Transportation System (SSITS) cask: preliminary design description, 8:24113 (R:US)
RADIOACTIVE PARTICULATES
See PARTICLES
RADIOACTIVE AEROSOLS
RADIOACTIVE TRACERS
See TRACER TECHNIQUES
RADIOACTIVE WASTE DISPOSAL
Environment and safety: major goals for MARS, 8:24846 (R:US)

Actinides
Actinide-solubility controls in performance assessment of nuclear-waste repositories, 8:23168 (R:US)
Basalt
Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository, 8:23166 (R:US)
Summary of past Basalt Waste Isolation Project overviews during preliminary site characterization, 8:23175 (R:US)
Containers
Canister materials proposed for final disposal of high level nuclear waste, 8:23144 (RA:DE)
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
HAW-containers as a barrier in final storage, 8:24108 (RA:DE:In German)
Corrosion Resistance
Interaction of vitrified high level waste with clay environment, 8:23141 (RA:DE)
Coverings
Design surface covers: an approach to long-term waste site stabilization, 8:23172 (R:US)
Engineered Safety Systems
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Feasibility Studies
Summary of past Basalt Waste Isolation Project overviews during preliminary site characterization, 8:23175 (R:US)
Geologic Deposits
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 2), June 1981-November 1982, 8:23153 (R:US)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Appendices. Final report (Task 2), June 1981-November 1982, 8:23154 (R:US)
Relationship of an in-situ test facility to a deep geologic repository for high-level nuclear waste. Final report (Task 4), June 1981-October 1982, 8:23151 (R:US)
Technical progress report for the quarter 1 January-31 March 1982, 8:23156 (R:US)
High-Level Radioactive Wastes
Actinide sorption on rock minerals, 8:23146 (RA:DE)
Application of systems analysis to the disposal of high level waste in deep ocean sediments, 8:23178 (J:GB)
Backfill barriers for nuclear waste repositories in salt, 8:23138 (RA:DE)
Calculation of the probability of volcanic disruption of a high-level radioactive waste repository within southern Nevada, USA, 8:23189 (J:GB)
Canister materials proposed for final disposal of high level nuclear waste, 8:23144 (RA:DE)
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
Criteria for high level waste disposal and characterization of barriers, 8:23129 (RA:DE)
HAW-containers as a barrier in final storage, 8:24108 (RA:DE:In German)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 2), June 1981-November 1982, 8:23153 (R:US)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Appendices. Final report (Task 2), June 1981-November 1982, 8:23154 (R:US)
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Relationship of an in-situ test facility to a deep geologic repository for high-level nuclear waste. Final report (Task 4), June 1981-October 1982, 8:23151 (R:US)
Requirements for the disposal of high-level radioactive wastes, 8:23139 (RA:DE)
Technical progress report for the quarter 1 January-31 March 1982, 8:23156 (R:US)
Low-Level Radioactive Wastes
Disposal of low-level radioactive biomedical wastes (an Academy Forum held November 24, 1980), 8:23157 (R:US)
Environmental monitoring considerations for low-level waste disposal sites, 8:23183 (R:US)
Massachusetts low-level radioactive-waste-management survey. National Low-Level Radioactive Waste Management Program, 8:23122 (R:US)
Trench design and construction techniques for low-level radioactive waste disposal (Shallow land burial), 8:23155 (R:US)
Marine Disposal
Application of systems analysis to the disposal of high level waste in deep ocean sediments, 8:23178 (J:GB)
Why not in the ocean, 8:23182 (J:XA)
Materials Testing
Leaching of polyphase nuclear waste ceramics: microstructural and phase characterization, 8:23181 (J:US)
Matrix Materials
FUETAP concrete - an alternative radioactive waste host, 8:23131 (RA:DE)
Meetings
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Mill Tailings
Decision-tree approach to evaluating inactive uranium-processing sites for liner requirements, 8:23161 (R:US)
Design surface covers: an approach to long-term waste site stabilization, 8:23172 (R:US)
Public Opinion
Organizational approach to estimating public resistance at proposed disposal sites for radioactive and hazardous wastes, 8:23120 (R:US)
Radionuclide Migration
Actinide sorption on rock minerals, 8:23146 (RA:DE)
Actinide-solubility controls in performance assessment of nuclear-waste repositories, 8:23168 (R:US)
Application of systems analysis to the disposal of high level waste in deep ocean sediments, 8:23178 (J:GB)
Criteria for high level waste disposal and characterization of barriers, 8:23129 (RA:DE)
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Reliability
Evaluation of the barriers in an ultimate storage for radioactive waste, 8:23143 (RA:DE:In German)
Research Programs
Technical progress report for the quarter 1 January-31 March 1982, 8:23156 (R:US)
Risk Assessment
Calculation of the probability of volcanic disruption of a high-level radioactive waste repository within southern Nevada, USA, 8:23189 (J:GB)
Rock Mechanics
Composition of rocks - criteria for the conditioning of high-level radioactive wastes, 8:23140 (RA:DE:In German)
Safety
Requirements for the disposal of high-level radioactive wastes, 8:23139 (RA:DE)
Salt Deposits
Effects of the product properties upon the ultimate storage medium salt and resulting conditions, 8:23142 (RA:DE:In German)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 2), June 1981-November 1982, 8:23153 (R:US)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Appendices. Final report (Task 2), June 1981-November 1982, 8:23154 (R:US)
Technical progress report for the quarter 1 January-31 March 1982, 8:23156 (R:US)

Shaft Excavations
Evaluation of alternative shaft-sinking techniques for high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 3), June 1981-July 1982, 8:23150 (R:US)
Site Selection
Mathematical model for evaluating the suitability of a low-level radioactive waste site, 8:23119 (R:US)
Methods for assessing the socioeconomic impacts of large-scale resource developments: implications for nuclear repository siting, 8:24303 (R:US)
Systems Analysis
Application of systems analysis to the disposal of high level waste in deep ocean sediments, 8:23178 (J:GB)
Technology Transfer
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Underground Disposal
Composition of rocks - criteria for the conditioning of high-level radioactive wastes, 8:23140 (RA:DE:In German)
Technical progress report for the quarter 1 January-31 March 1982, 8:23156 (R:US)
Trench design and construction techniques for low-level radioactive waste disposal (Shallow land burial), 8:23155 (R:US)

RADIOACTIVE WASTE FACILITIES
Construction
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 2), June 1981-November 1982, 8:23153 (R:US)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Appendices. Final report (Task 2), June 1981-November 1982, 8:23154 (R:US)
Trench design and construction techniques for low-level radioactive waste disposal (Shallow land burial), 8:23155 (R:US)
Cost
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
Decommissioning
Decontamination and decommissioning of TAN radioactive liquid-waste-evaporator system (PM-2A). Final report, 8:23123 (R:US)
Decontamination
Decontamination and decommissioning of TAN radioactive liquid-waste-evaporator system (PM-2A). Final report, 8:23123 (R:US)
Design
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 2), June 1981-November 1982, 8:23153 (R:US)
In-situ test programs related to design and construction of high-level nuclear waste (HLW) deep geologic repositories. Appendices. Final report (Task 2), June 1981-November 1982, 8:23154 (R:US)
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
Trench design and construction techniques for low-level radioactive waste disposal (Shallow land burial), 8:23155 (R:US)
Economic Impact
Methods for assessing the socioeconomic impacts of large-scale resource developments: implications for nuclear repository siting, 8:24303 (R:US)
Monitoring
Environmental monitoring considerations for low-level waste disposal sites, 8:23183 (R:US)
Social Impact
Methods for assessing the socioeconomic impacts of large-scale resource developments: implications for nuclear repository siting, 8:24303 (R:US)
Test Facilities
Relationship of an in-situ test facility to a deep geologic repository for high-level nuclear waste. Final report (Task 4), June 1981-October 1982, 8:23151 (R:US)

RADIOACTIVE WASTE MANAGEMENT
Alpha-Bearing Wastes
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
High-Level Radioactive Wastes
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Inventories
Byproduct inventories, 8:23171 (R:US)
Legislation
Information report on state legislation, 8:23149 (R:US)
Low-Level Radioactive Wastes
Comprehensive low-level waste management plan for the state of Kentucky. Fifth quarterly report for the period ending December 31, 1982, 8:23121 (R:US)
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Massachusetts low-level radioactive-waste-management survey. National Low-Level Radioactive Waste Management Program, 8:23122 (R:US)
Meetings
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Public Opinion
Too hot to handle. Social and policy issues in the management of radioactive wastes, 8:23177 (B:US)
Regional Cooperation
Comprehensive low-level waste management plan for the state of Kentucky. Fifth quarterly report for the period ending December 31, 1982, 8:23121 (R:US)
Research Programs
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Spent Fuels
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Technology Transfer
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)

RADIOACTIVE WASTE PROCESSING
Alpha-Bearing Wastes
Los Alamos Controlled Air Incinerator for radioactive waste. Volume I. Rationale, process, equipment, performance, and recommendations, 8:23147 (R:US)
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
By-Products
Technology for recovery of byproducts, 8:23173 (R:US)
Combustion
Los Alamos Controlled Air Incinerator for radioactive waste. Volume I. Rationale, process, equipment, performance, and recommendations, 8:23147 (R:US)
Cost Benefit Analysis
Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository, 8:23166 (R:US)
Fuel Feeding Systems
Design and performance of feed-delivery systems for simulated radioactive waste slurries, 8:23160 (R:US)

High-Level Radioactive Wastes
Capacity of the borosilicate glass VG 98/12 for components of the high-level radioactive waste, 8:23130 (RA:DE:In German)
Ceramic nuclear waste forms, 8:23134 (RA:DE)
Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository, 8:23166 (R:US)
Compared quantitative determination of nuclear waste glass crystallization rate by light microscopy and X-ray diffraction, 8:23132 (RA:DE)
Design and performance of feed-delivery systems for simulated radioactive waste slurries, 8:23160 (R:US)
Diopside glass-ceramic material for the immobilization of radioactive wastes, 8:23133 (RA:DE)
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Overview on product forms, 8:23126 (RA:DE:In German)
Review of multibarrier waste form development, 8:23135 (RA:DE)
Using process instrumentation to obviate destructive examination of canisters of HLW glass, 8:23169 (R:US)
Iodine 129
Iodine-fixation studies at the Pacific Northwest Laboratory, 8:23165 (R:US)
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Krypton
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Krypton 85
Potential for beneficial use of krypton-85, 8:23170 (R:US)
Laser Isotope Separation
Laser isotope separation in nuclear-waste by-product utilization, 8:23176 (R:US)
Low-Level Radioactive Wastes
Solidification of oils and organic liquids, 8:23118 (R:US)
Meetings
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Mill Tailings
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Sludges
Waste sludge composition at the Savannah River Plant, 8:23180 (J:US)
Solidification
Capacity of the borosilicate glass VG 98/12 for components of the high-level radioactive waste, 8:23130 (RA:DE:In German)
Ceramic nuclear waste forms, 8:23134 (RA:DE)
Design and performance of feed-delivery systems for simulated radioactive waste slurries, 8:23160 (R:US)
Diopside glass-ceramic material for the immobilization of radioactive wastes, 8:23133 (RA:DE)
FUETAP concrete - an alternative radioactive waste host, 8:23131 (RA:DE)
Nuclear waste management. Quarterly progress report, October through December 1980, 8:23158 (R:US)
Overview on product forms, 8:23126 (RA:DE:In German)
Review of multibarrier waste form development, 8:23135 (RA:DE)
Solidification of oils and organic liquids, 8:23118 (R:US)
Thermal analysis, thermogravimetry and crystal chemical characterization of phases, 8:23136 (RA:DE)
Using process instrumentation to obviate destructive examination of canisters of HLW glass, 8:23169 (R:US)
Surface Coating
Review of multibarrier waste form development, 8:23135 (RA:DE)
Technology Transfer
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Vitrification
Compared quantitative determination of nuclear waste glass crystallization rate by light microscopy and X-ray diffraction, 8:23132 (RA:DE)
Development of the borosilicate glass for the vitrification plant PAMELA, 8:23127 (RA:DE:In German)

RADIOACTIVE WASTE STORAGE
Containers
Design and testing of the TX-4 Type A container for packaging radioactive waste, 8:24114 (R:US)
Cost
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
High-Level Radioactive Wastes
Concepts for the ultimate storage in geological formations, 8:23137 (RA:DE:In German)
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
Storage Facilities
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
Underground Disposal
Concepts for the ultimate storage in geological formations, 8:23137 (RA:DE:In German)
Underground Storage
Summarized representation of the progress and results of the suitability test of the Konrad pit for final storage of radioactive wastes, 8:23125 (R:DE:In German)

RADIOACTIVE WASTES
See also ALPHA-BEARING WASTES
HIGH-LEVEL RADIOACTIVE WASTES
LOW-LEVEL RADIOACTIVE WASTES
RADIOACTIVE EFFLUENTS
Containers
Design and testing of the TX-4 Type A container for packaging radioactive waste, 8:24114 (R:US)
Leaching
Critical review of radiation effects on borosilicate glasses, 8:24004 (RA:DE)
Radiation Effects
Critical review of radiation effects on borosilicate glasses, 8:24004 (RA:DE)

RADIOCRYSTALLOGRAPHY
See CRYSTALLOGRAPHY

RADIOGRAPHS
See IMAGES

RADIOGRAPHY (BIOMEDICAL)
See BIOMEDICAL RADIOGRAPHY

RADIOISOTOPE HEAT SOURCES
Capsules
Flight-systems safety program, September 1982. Progress report, 8:23202 (R:US)
Quality Control
Heat-source specification 500 watt(e) RTG, 8:23201 (R:US)
Research Programs
Flight-systems safety program, September 1982. Progress report, 8:23202 (R:US)
Specifications
Heat-source specification 500 watt(e) RTG, 8:23201 (R:US)

RADIOISOTOPE MIGRATION
See RADIONUCLIDE MIGRATION

RADIOLOGICAL PERSONNEL
Mortality
Hanford-worker health study: a status report, 8:24391 (R:US)
Radiation Protection
Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R:US)

RADIOLOGICAL PROTECTION
See RADIATION PROTECTION

RADIONUCLIDE MIGRATION
In environment.
Analysis of radiation exposure for troop observers, Exercise Desert Rock VI, Operation Teapot. Final report 1 Mar-15 Jul 80, 8:24359 (R:US)
Mathematical Models
Mathematical model for evaluating the suitability of a low-level radioactive waste site, 8:23119 (R:US)

RADIONUCLIDE TRANSFER (IN ENVIRONMENT)
See RADIONUCLIDE MIGRATION
RADIOSURGERY
See RADIOTHERAPY
RADIOTHERAPY
Optimization
Radiation therapy: model standards for determination of need, 8:24341 (R:US)
Standards
Radiation therapy: model standards for determination of need, 8:24341 (R:US)
RADIOWAVE RADIATION
Health Hazards
Potential human study populations for non-ionizing (radio frequency) radiation health effects, 8:24480 (R:US)
RADIUM
Carcinogenesis
Radium dial workers, 8:24364 (R:US)
RADIUM 226
Radioecological Concentration
Distribution and possible causes of radionuclides in groundwaters of Missouri, 8:24296 (J:US)
Distribution of ^{226}Ra in the lower paleozoic aquifers of southeast Kansas and adjacent areas, 8:24297 (J:US)
Radioactivity in groundwater associated with uranium and phosphate mining and processing, 8:24298 (J:US)
Radionuclide Migration
Distribution of ^{226}Ra in the lower paleozoic aquifers of southeast Kansas and adjacent areas, 8:24297 (J:US)
RADIUM 228
Radioecological Concentration
Distribution and possible causes of radionuclides in groundwaters of Missouri, 8:24296 (J:US)
RADIUM B
See LEAD 214
RADIUM D
See LEAD 210
RADIUM F
See POLONIUM 210
RADON
Adsorption
Effects of moisture on radon emanation including the effects on diffusion. Open file report oct 79-Nov 81, 8:23097 (R:US)
Diffusion
Effects of moisture on radon emanation including the effects on diffusion. Open file report oct 79-Nov 81, 8:23097 (R:US)
RADON 226
Inhalation
Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R:US)
Uptake
Some aspects of radon and its daughter-products in man and his environment, 8:24362 (R:US)
RAFT RIVER VALLEY
Seismic Surveys
Seismic baseline and induction studies: Roosevelt Hot Springs, Utah and Raft River, Idaho, 8:23370 (R:US)
RAINOUT
See WASHOUT
RANDOMNESS
RANDOM NUMBERS; obtained from U235 alpha decay (IBM370,303x; Binary (random numbers) and FORTRAN IV (AFRAND and Driver)), 8:25256 (R:US)
RANKINE CYCLE POWER SYSTEMS
Computerized Simulation
STESEP; solar total energy system evaluation (CDC6600,7600;IBM370; FORTRAN IV), 8:23297 (R:US)
Economics
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R:US)
Evaluation
STESEP; solar total energy system evaluation (CDC6600,7600;IBM370; FORTRAN IV), 8:23297 (R:US)
Performance
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R:US)
Working Fluids
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R:US)
RARE EARTH COMPOUNDS
See also CERIUM COMPOUNDS
Band Theory
Band model for d- and f-metals, 8:23946 (R:US)
Electronic Structure
Spectroscopic properties of the f-elements in compounds and solutions (79 references), 8:24078 (R:US)
Energy Levels
Spectroscopic properties of the f-elements in compounds and solutions (79 references), 8:24078 (R:US)
Excited States
Spectroscopic properties of the f-elements in compounds and solutions (79 references), 8:24078 (R:US)
Fermi Level
Band model for d- and f-metals, 8:23946 (R:US)
RARE EARTH NUCLEI
For nuclear properties of rare earths.
See also CERIUM 144
DYSPROSIUM 154
ERBIUM 164
GADOLINIUM 150
GADOLINIUM 156
GADOLINIUM 160
PROMETHIUM 147
SAMARIUM 142
TERBIUM 147
Band Theory
Band model for d- and f-metals, 8:23946 (R:US)
Fermi Level
Band model for d- and f-metals, 8:23946 (R:US)
High Spin States
High spins in gamma-soft nuclei, 8:24704 (R:US)
RARE EARTHS
See also CERIUM
GADOLINIUM
Environmental Transport
Microcracks and energy. Progress report, 1 March 1982-28 February 1983, 8:23096 (R:US)
RATIONING
See ALLOCATIONS
RATS
Delayed Radiation Effects
Carcinogenesis following prenatal exposure to radiation, 8:24395 (J:DE)
Sensitivity
Effects of supplemental mangesium on blood and tissue lead levels and toxicity of ingested lead in the rat, 8:24469 (J:US)
RDF
See REFUSE DERIVED FUELS
REACTOR ACCIDENTS
See also FUEL ELEMENT FAILURE
LOSS OF COOLANT
LOSS OF FLOW
MELTDOWN
REACTOR CORE DISRUPTION
TRANSIENT OVERPOWER ACCIDENTS
Computer Codes
CACECO; LMFBR containment accident analysis (CDC CYBER74;CDC7600; CDC FORTRAN Extended with only a few statements that do not comply with the American National Standards Institute (ANSI) FORTRAN.), 8:23511 (R:US)
PROSA2; probabilistic response surface studies (IBM370; FORTRAN IV (95%) and Assembly language (5%)), 8:23580 (R:US)
Computerized Simulation
NALAP; LMFBR transient response to accident (CDC7600,CYBER76; FORTRAN IV (99%) and COMPASS (1%)), 8:23581 (R:US)
Containment
A model for predicting containment response to hydrogen burns, 8:23654 (J:US)
Environmental Impacts
CRAC calculations for accident sections of environmental statements, 8:23633 (R:US)

Fission Product Release
Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5 (LMFBR), 8:23617 (R:US)
Heat Transfer
Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior, 8:23601 (R:US)
RELAP5 assessment: FLECHT SEASET steam-generator test 23402 (PWR), 8:23632 (R:US)
Hydraulics
Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior, 8:23601 (R:US)
RELAP5 assessment: FLECHT SEASET steam-generator test 23402 (PWR), 8:23632 (R:US)
Mathematical Models
A model for predicting containment response to hydrogen burns, 8:23654 (J:US)
Radioactive Aerosols
Aerosol Behavior Code Validation and Evaluation (ABCOVE) Program: preliminary results of Test AB5 (LMFBR), 8:23617 (R:US)
MAEROS user manual (LMFBR), 8:23627 (R:US)
Radioactivity Transport
HAARM3; aerosol behavior log-normal dist model (CDC6400,7600,CYBER73; FORTRAN IV, FTN4.5 (CDC7600)), 8:23582 (R:US)
Risk Assessment
CRAC calculations for accident sections of environmental statements, 8:23633 (R:US)

REACTOR CHANNELS
Passage through the reactor.
Filters
Removable, hermetically-sealing, filter attachment system for hostile environments, 8:23552 (P:US)

REACTOR CHARGING MACHINES
Mathematical Models
Two-phase jet load models, 8:23656 (J:US)

REACTOR COMPONENTS
See also BREEDING BLANKETS
CORE CATCHERS
FUEL ELEMENTS
REACTOR CHANNELS
REACTOR CHARGING MACHINES
REACTOR COOLING SYSTEMS
REACTOR CORES
Research Programs
Reactor-safety research programs. Quarterly report, July-September 1982, 8:23549 (R:US)
Supports
Fracture toughness of PWR-components supports, 8:23505 (R:US)

REACTOR CONTROL SYSTEMS
Consoles
Using cognitive modeling to improve the man-machine interface (PWR), 8:23561 (RA:US)
Visual momentum: an example of cognitive models applied to interface design, 8:23560 (RA:US)
Failures
Common-cause fault rates for instrumentation and control assemblies, 8:23631 (R:US)
Human Factors Engineering
Cognitive models and computer aids for nuclear plant control room operators, 8:23559 (RA:US)
Cognitive models embedded in system simulation models, 8:23565 (RA:US)
Framework for modeling supervisory control behavior of operators of nuclear power plants, 8:23558 (RA:US)
Human cognition, 8:23562 (RA:US)
Outline of a model of human problem solving in failure situations, 8:23564 (RA:US)
Role of cognitive models of operators in the design, operation and licensing of nuclear power plants, 8:23557 (RA:US)
Role of conceptual models in nuclear power plant operation, 8:23563 (RA:US)
Rule-based approach to cognitive modeling of real-time decision making, 8:23566 (RA:US)
Workshop on cognitive modeling of nuclear-plant control-room operators, 8:23556 (R:US)

REACTOR CONTROL THEORY
See REACTOR KINETICS

REACTOR COOLING SYSTEMS
Level Indicators
Liquid level sensing device, 8:23506 (P:US)
Molten Metal-Water Reactions
PTA1; pipe system pressure analysis (IBM370/195; FORTRAN IV), 8:23510 (R:US)
Pressure Gradients
PTA1; pipe system pressure analysis (IBM370/195; FORTRAN IV), 8:23510 (R:US)
Transients
Simulation of thermal-transient-induced-pipe-flow stratification using COMMIX-2, 8:23542 (R:US)

REACTOR CORE DISRUPTION
After-Heat Removal
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium (LMFBR), 8:23596 (R:US)
Containment Systems
ALICE-11: an arbitary lagrangian-eulerian code for containment analysis with complex internals, 8:23642 (J:US)
Dispersion Nuclear Fuels
Role of fuel power in HCDA early fuel dispersal, 8:23650 (J:US)
Dryout
Application of debris-bed dryout data to CONACS-1 modeling, 8:23599 (R:US)
Effect of particle stratification on debris-bed dryout (LMFBR), 8:23598 (R:US)
Fluid-Structure Interactions
Fluid-cushioned impact between reactor fuel assemblies for seismic disturbances, 8:23643 (J:US)
Fuel-Cladding Interactions
Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J:US)
The effects of flowing fuel particulate on bulk freezing predictions, 8:23647 (J:US)
Heat Transfer
Effect of particle stratification on debris-bed dryout (LMFBR), 8:23598 (R:US)
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium (LMFBR), 8:23596 (R:US)
Interaction and penetration of heated UO_2 with limestone concrete (LMFBR), 8:23597 (R:US)
Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations, 8:23605 (R:US)
Hydraulics
Effect of particle stratification on debris-bed dryout (LMFBR), 8:23598 (R:US)
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium (LMFBR), 8:23596 (R:US)
Thermal hydraulic aspects in the analysis of LMFBR disrupted-core situations, 8:23605 (R:US)
Liquid Flow
Experimental investigation of the unsteady one-phase flow through perforated plates, 8:23620 (R:DE:In German)
Mathematical Models
An assessment of SIMMER-11 freezing, melting, and plugging calculations, 8:23646 (J:US)
Risk Assessment
Selection of low-risk design guidelines for energetic events, 8:23591 (R:US)
S Codes
Status and validation of the SAS4A accident-analysis code system, 8:23592 (R:US)
Thermal Stresses
Interaction and penetration of heated UO_2 with limestone concrete (LMFBR), 8:23597 (R:US)
Transients
An improved quasistatic method for transition-phase calculations, 8:23657 (J:US)

REACTOR CORE RESTRAINTS
Strains
NUBOW-2D Inelastic; bowed reactor core analysis (IBM370; FORTRAN IV), 8:23514 (R:US)
Three-Dimensional Calculations
Core restraint analysis of a free-flowering large heterogeneous LMFBR, 8:23644 (J:US)
REACTOR CORES
Accidents
In-plant considerations for optimal offsite response to reactor accidents, 8:23574 (R:US)
Criticality
Nuclear criticality safety experiments, calculations, and analyses: 1958 to 1982. Volume 1. Lookup tables, 8:23544 (R:US)
Nuclear criticality safety experiments, calculations, and analyses - 1958 to 1982. Volume 2. Summaries. Compilation of papers from the Transactions of the American Nuclear Society, 8:23545 (R:US)
REACTOR DECOMMISSIONING
Financing
Funding nuclear-power-plant decommissioning. Final report, 8:23536 (R:US)
REACTOR FUEL ELEMENTS
See FUEL ELEMENTS
REACTOR FUELS
See NUCLEAR FUELS
REACTOR INSTRUMENTATION
Failures
Common-cause fault rates for instrumentation and control assemblies, 8:23631 (R:US)
Level Indicators
Development of an improved-contact liquid-level probe for pressurized reactor vessels, 8:23495 (R:US)
REACTOR KINETICS
Research Programs
Reactor-safety research programs. Quarterly report, July-September 1982, 8:23549 (R:US)
REACTOR LATTICES
Dancoff Correction
Incorporation of clad effects into Sauer's method for computing Dancoff factors, 8:23548 (J:GB)
REACTOR LICENSING
BWR high burnup licensing assessment, 8:23461 (RA:US)
PWR high burnup licensing assessment, 8:23490 (RA:US)
Regulatory licensing status summary report. Nuclear power plants data for decisions (blue book), February 1-February 28, 1983, 8:23526 (R:US)
Regulatory and technical reports, 8:23524 (R:US)
Computer Calculations
BONAMI-S: response self-shielding by the Bondarenko method. Volume 2. Functional studies (BONAMI-S code), 8:23543 (R:US)
REACTOR MATERIALS
To be assigned in conjunction with the specific descriptor for the material used in a reactor, provided this descriptor is not yet up-posted to reactor materials.
See also NUCLEAR FUELS
Corrosion
Plant Materials Program: progress June 1981-May 1982 (PWR; BWR), 8:23465 (R:US)
Fracture Properties
Fracture toughness of PWR-components supports, 8:23505 (R:US)
Research Programs
Reactor-safety research programs. Quarterly report, July-September 1982, 8:23549 (R:US)
Sorptive Properties
Diffusion of hydrogen in yttrium, 8:23553 (TJ:US)
Thermodynamic Properties
Calculation of thermophysical properties of sodium (LMFBR), 8:23516 (R:US)
REACTOR OPERATION
Computer Codes
FRANTIC-NRC; time-dependent system unavailability (IBM370; FORTRAN IV), 8:25236 (R:US)
Legal Aspects
Regulatory perspective on extended burnup fuel (PWR; BWR), 8:23522 (RA:US)
REACTOR OPERATORS
Human Factors Engineering
Role of cognitive models of operators in the design, operation and licensing of nuclear power plants, 8:23557 (RA:US)
Meetings
Workshop on cognitive modeling of nuclear-plant control-room operators, 8:23556 (R:US)
Performance
Cognitive models and computer aids for nuclear plant control room operators, 8:23559 (RA:US)
Cognitive models embedded in system simulation models, 8:23565 (RA:US)
Framework for modeling supervisory control behavior of operators of nuclear power plants, 8:23558 (RA:US)
Human cognition, 8:23562 (RA:US)
Outline of a model of human problem solving in failure situations, 8:23564 (RA:US)
Role of conceptual models in nuclear power plant operation, 8:23563 (RA:US)
Rule-based approach to cognitive modeling of real-time decision making, 8:23566 (RA:US)
Workshop on cognitive modeling of nuclear-plant control-room operators, 8:23556 (R:US)
Standards
Review of qualification for nuclear power plant operators, 8:23537 (J:US)
REACTOR SAFETY
Regulatory and technical reports, 8:23524 (R:US)
Data Analysis
Introductory user's manual for the US Nuclear Regulatory Commission Reactor Safety Research Data Bank, 8:23628 (R:US)
Data Base Management
Organization and structure of an EPRI DATATRAN data bank (PWR; BWR), 8:23613 (R:US)
Mathematical Models
Analysis of a partial scram event in a typical BWR/4, 8:23653 (J:US)
Research Programs
Nuclear safety project, 8:23618 (R:DE:In German)
Selected review and evaluation of US safety research vis-a-vis foreign safety research for nuclear power plants, 8:23636 (R:US)
REACTOR SHUTDOWN
See also SCRAM
After-Heat Removal
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
Heat Transfer
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
Hydraulics
Heat transfer to water from a vertical tube bundle under natural-circulation conditions (PWR;BWR), 8:23635 (R:US)
REACTOR VESSELS
For nonpressurized containers of reactor cores and associated components.
Steady-State Conditions
Steady-state simulation of the FFTF in-vessel thermal hydraulics, 8:23577 (J:US)
REACTORS
See also GAS COOLED REACTORS
LIQUID METAL COOLED REACTORS
POWER REACTORS
PROCESS HEAT REACTORS
PULSED REACTORS
WATER COOLED REACTORS
Availability
FRANTIC-NRC; time-dependent system unavailability (IBM370; FORTRAN IV), 8:25236 (R:US)
RECEIVERS (SOLAR)
See SOLAR RECEIVERS
RECORDS RETRIEVAL
See INFORMATION RETRIEVAL

RECOVERY (TRITIUM)
See TRITIUM RECOVERY
RECYCLE (FUEL)
See FUEL CYCLE
RECYCLING (FUEL)
See REPROCESSING
REFRACTORIES
Temperature Effects
Thermomechanical behavior of refractory concrete linings, 8:22939 (J:US)
REFRIGERANTS
Absorption
Optimization of adsorbate-absorbent couples. Final report, 8:23321 (R:XE:FR)
Adsorption
Optimization of adsorbate-absorbent couples. Final report, 8:23321 (R:XE:FR)
REFUSE
See SOLID WASTES
REFUSE DERIVED FUELS
Review and evaluation of a bioconversion-process demonstration plant and its related technologies, 8:23874 (R:US)
Cocombustion
Seminar proceedings: municipal solid waste as a utility fuel, 8:23877 (R:US)
Health Hazards
Environmental and health aspects of waste-to-energy systems, 8:24402 (R:US)
REFUSE-FUELED POWER PLANTS
Cogeneration
Cogeneration Energy Recovery Facility feasibility study: project summary, 8:23862 (R:US)
Design
Fluidized bed retrofit study of CE-VUX type boiler at the Jamestown Board of Public Utilities, Carlson Station, Jamestown, New York, 8:23424 (R:US)
Economic Analysis
Cogeneration Energy Recovery Facility feasibility study: project summary, 8:23862 (R:US)
Fluidized bed retrofit study of CE-VUX type boiler at the Jamestown Board of Public Utilities, Carlson Station, Jamestown, New York, 8:23424 (R:US)
Feasibility Studies
Cogeneration Energy Recovery Facility feasibility study: project summary, 8:23862 (R:US)
Meetings
Seminar proceedings: municipal solid waste as a utility fuel, 8:23877 (R:US)
REGION V
See FEDERAL REGION V
REGOLITH
See OVERBURDEN
REINFORCED CONCRETE
Destructive Testing
Full-scale turbine-missile concrete impact experiments. Final report, 8:23610 (R:US)
Stress Analysis
NONSAP-C; nonlinear stress concrete structures (CDC7600; FORTRAN IV (CDC FORTRAN Extended)), 8:24026 (R:US)
RELATIVISTIC PLASMA
Langmuir Frequency
Relativistic effects on strong Langmuir turbulence, 8:24807 (J:GB)
RELEASE (FISSION PRODUCT)
See FISSION PRODUCT RELEASE
REMOTE HANDLING EQUIPMENT
See also MANIPULATORS
Performance Testing
Role of mockup testing in the Hot Fuel Examination Facility remote operations, 8:24103 (R:US)
REMOVAL (AFTER-HEAT)
See AFTER-HEAT REMOVAL
RENEWABLE ENERGY SOURCES
See also BIOMASS
GEOTHERMAL ENERGY
HYDROELECTRIC POWER
SOLAR ENERGY
TIDAL POWER
WAVE POWER
WIND POWER
Directories
International directory of new and renewable energy information sources and research centres. First edition, 8:23762 (B:UE)
Information Centers
International directory of new and renewable energy information sources and research centres. First edition, 8:23762 (B:UE)
Information Systems
International directory of new and renewable energy information sources and research centres. First edition, 8:23762 (B:UE)
REPORTING REQUIREMENTS
Legal Aspects
Dissemination of technical information from the oil-shale program, 8:23079 (R:US)
REPROCESSING
See also PUREX PROCESS
Effect of high solvent radiation exposures on TBP processing of spent LMFBR fuels, 8:23519 (R:US)
Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel, 8:23463 (RA:US)
Criticality
Nuclear criticality safety experiments, calculations, and analyses: 1958 to 1982. Volume 1. Lookup tables, 8:23544 (R:US)
Nuclear criticality safety experiments, calculations, and analyses - 1958 to 1982. Volume 2. Summaries. Compilation of papers from the Transactions of the American Nuclear Society, 8:23545 (R:US)
Meetings
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Safety
US Department of Energy comments on the paper entitled "Bubble, bubble, toil and trouble: reprocessing nuclear spent fuel", 8:23112 (R:US)
Technology Transfer
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
REPUBLIC OF KOREA
Energy Policy
Argonne Energy Model - Portugal, 8:23692 (R:US)
RESEARCH PROGRAMS
To be used jointly with descriptor(s) for subject field and/or organization concerned.
Planning
Pacific Northwest regional energy planning module III: policy options and programs. Development of standards and program packages. Volume I. Summary. Final report, Phase 2, 8:23693 (R:US)
Standards
Pacific Northwest regional energy planning Module III: policy options and programs. Development of standards and program packages. Volume II. Technical report. Final report, Phase 2, 8:23719 (R:US)
RESEARCH REACTORS
See also FFTF REACTOR
KUHFR REACTOR
Data Compilation
Nuclear reactors built, being built, or planned in the Unites States as of June 30, 1981, 8:23443 (R:US)
Fuel Cycle
Effect of reduced enrichment on the fuel cycle for research reactors, 8:23576 (R:US)
Fuel Element Failure
Release of fission products from irradiated aluminide fuel at high temperature, 8:23604 (R:US)

Fuel Plates
Release of fission products from irradiated aluminide fuel at high temperature, 8:23604 (R:US)
RESELLERS
Coercion
Allegations of improper supplier practices affecting gasoline lines at independent stations, 8:23042 (R:US)
RESERVOIR FLUIDS
Fluid Flow
Useful technique to study particle invasion in porous media by backscattered electron imaging, 8:23015 (J:US)
Surface Tension
Effect of the rate of adsorption at oil-water interface upon the displacement of residual oil, 8:23019 (R:US)
RESERVOIR ROCK
Porosity
Deep-burial diagenesis. Annual progress report, 1982-1983, 8:24498 (R:US)
Scanning Electron Microscopy
Useful technique to study particle invasion in porous media by backscattered electron imaging, 8:23015 (J:US)
RESIDENCES
See HOUSES
RESIDENTIAL BUILDINGS
See also APARTMENT BUILDINGS
HOUSES
Air Conditioners
Effects of cyclic response of residential air conditioners on seasonal performance, 8:23840 (J:US)
Air Conditioning
DOE test procedure setup measurement errors: part 1, 8:23839 (J:US)
Generalized heating and cooling load models for seasonal performance calculation, 8:23838 (J:US)
Fuel Consumption
Residential fuel comparison patterns for poor, black, and elderly households: a comparative study. Vol I. Data base development, 8:23793 (R:US)
Heating Systems
Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23802 (R:DE:In German)
Passive Solar Heating Systems
Class B performance monitoring of passive/hybrid solar buildings, 8:23326 (R:US)
Photovoltaic Power Supplies
Westinghouse final report: design and fabrication of a prototype system for photovoltaic residences in the Southwest, 8:23291 (R:US)
Space Heating
Generalized heating and cooling load models for seasonal performance calculation, 8:23838 (J:US)
Weatherization
Do-it-yourself home energy-saving techniques. 1981-82 annual technical progress report, September 25, 1981-June 30, 1982, 8:23815 (R:US)
Self-help energy conservation programs for low-income groups: the SMILE experience, 8:23826 (R:US)
RESIDENTIAL SECTOR
Rate guide for residential No. 2 heating oil and coal for SOLCOST Data Bank cities, 8:23001 (R:US)
Energy Consumption
Monthly Energy Review, 8:23755 (R:US)
Residential energy consumption survey. Consumption patterns of household vehicles, supplement: January 1981-September 1981, 8:23756 (R:US)
Energy Demand
Residential demand for energy: a time-series and cross-sectional analysis for eight OECD countries, 8:23818 (R:US)
Power Demand
Case for electricity: an applications approach, 8:23728 (R:US)
Typical electric bills. January 1, 1982, 8:23730 (R:US)
Waste Heat Utilization
Fundamental study on the feasibility of waste heat utilization in households, 8:23848 (R:DE:In German)
RESIDUES
See also ASHES
Chemical Composition
Advanced characterization of combustion and conversion feedstocks, 8:22995 (R:US)
Supercritical Gas Extraction
Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R:US)
RESIDUES (RADIOACTIVE)
See RADIOACTIVE WASTES
RESINS
Chemical Properties
Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ:US)
Comparative Evaluations
Behavior of tetravalent plutonium with various ion exchangers in solutions containing nitric acid and oxalates (Dowex 50W-X8, Dowex 1-X8 and Dowex chelating resin Al-X8), 8:24053 (TG:US)
Manufacturing
Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ:US)
Physical Properties
Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ:US)
Uses
Qualities and processes of diallyl phthalate resin: translated from the Japanese, 8:24025 (TJ:US)
RESOURCE RECOVERY FACILITIES
Guidebook for evaluation of resource recovery systems in municipalities, 8:23878 (R:US)
Landfill gas recovery in the USA, 8:23873 (R:US)
Financing
Resource-recovery option in solid-waste management: a review guide for public officials, 8:23875 (R:US)
Marketing
Resource-recovery option in solid-waste management: a review guide for public officials, 8:23875 (R:US)
Operation
Review and evaluation of a bioconversion-process demonstration plant and its related technologies, 8:23874 (R:US)
RESPIRABLE DUSTS
See DUSTS
RETICULAR CELLS
See RETICULOENDOTHELIAL SYSTEM
RETICULOENDOTHELIAL SYSTEM
Immunosuppression
Chemical effects on the immune system, 8:24448 (RA:US)
REVERSE-FIELD PINCH
Current-Drive Heating
Possible steady state current drive for reversed field pinch discharges, 8:24811 (J:US)
Design
Design principles for a large RFP experiment, 8:24947 (J:US)
Engineering
Engineering needs of a TRACT fusion reactor program, 8:24952 (J:US)
TPE-1R (M) reversed field pinch experiment, 8:24948 (J:US)
Liners
Surface interactions in a reverse field pinch, 8:24887 (J:NL)
Operation
Theoretical and experimental evaluation of the parameters in the new configuration of ETA-BETA II, 8:25218 (J:US)
Stress Analysis
Comparison of numerical solutions of the shell stress analysis for a large RFP experiment, 8:24949 (J:US)
RHENIUM COMPLEXES
Catalytic Effects
Synthetic and catalytic studies directed toward homogeneously catalyzed selective oxidation. Final report, 8:24059 (R:US)
RHO-765 RESONANCES
Coherent Production
Radiative decay width of the rho$^-$ meson, 8:24623 (J:US)
Radiative Decay
Radiative decay width of the rho$^-$ meson, 8:24623 (J:US)

RHODIUM
Agglomeration
Structure of bimetallic clusters. Extended x-ray absorption fine structure (EXAFS) studies of Ir—Rh clusters, 8:23972 (J:US)
Inventories
Byproduct inventories, 8:23171 (R:US)
Recovery
Technology for recovery of byproducts, 8:23173 (R:US)
RHODIUM BORIDES
Ferromagnetism
Study of coexistence of ferromagnetism and superconductivity in single-crystal $ErRh_4B_4$, 8:23996 (R:US)
Magnetic Specific Heat
Magnetic correlations in $ErRh_4B_4$, 8:24015 (BA:US)
Phase Transformations
Observation of a first-order phase transition in single-crystal $ErRh_4B_4$ at H/sub c2/, 8:24002 (R:US)
Spin-Lattice Relaxation
^{11}B study of spin dynamics in Y/sub 1-x/RE/sub x/Rh_4B_4 (RE = Gd, Er), 8:23999 (R:US)
Superconductivity
Observation of a first-order phase transition in single-crystal $ErRh_4B_4$ at H/sub c2/, 8:24002 (R:US)
Study of coexistence of ferromagnetism and superconductivity in single-crystal $ErRh_4B_4$, 8:23996 (R:US)
RHODIUM COMPLEXES
Catalytic Effects
Synthetic and catalytic studies directed toward homogeneously catalyzed selective oxidation. Final report, 8:24059 (R:US)
RHYOLITES
Chemical Composition
Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences, 8:24491 (R:US)
Petrology
Chemical and textural surface features of pyroclasts from hydrovolcanic eruption sequences, 8:24491 (R:US)
Textural analysis of tephra from a rhyodacitic eruption sequence, Thira (Santorini), Greece, 8:24490 (R:US)
RICHLAND FFTF REACTOR
See FFTF REACTOR
RIEMANN FUNCTION
Numerical Solution
FASTCAR; solution of Cauchy-Riemann equations (CDC6600,7600;IBM360,370; FORTRAN IV), 8:25251 (R:US)
RIGHTS-OF-WAY
Plants
Transmisson-Facilities Vegetation-Management Program: Bonneville Power Administration. Draft environmental impact statement, 8:24309 (R:US)
RINGS (STORAGE)
See STORAGE RINGS
RISER CRACKING
See COAL LIQUEFACTION
RISK ASSESSMENT
Mathematical Models
Dose response modeling for chemical mutagens, 8:24438 (RA:US)
ROADS
Building Materials
Energy involved in construction materials and procedures, 8:23844 (R:US)
Energy Consumption
Energy involved in construction materials and procedures, 8:23844 (R:US)
ROADWAYS (MINES)
See MINE ROADWAYS
ROBERT E. GINNA-1 REACTOR
See GINNA-1 REACTOR
ROBINSON-2 REACTOR
Fuel Rods
High burnup performance of Exxon Nuclear Company fuel in the H. B. Robinson pressurized water reactor, 8:23477 (RA:US)
ROCK BURSTS
Stress Relaxation
Pilot working for the prevention of rock bumps in seam Wilhelm/Johann in Colliery Sachsen, 8:22968 (R:DE:In German)
ROCKS
See also SYNTHETIC ROCKS
Chemical Composition
Composition of rocks - criteria for the conditioning of high-level radioactive wastes, 8:23140 (RA:DE:In German)
Crack Propagation
Time depdendent crack growth and failure in brittle rock, 8:24500 (R:US)
Phase Transformations
Depositional environments, subsurface stratigraphy, and post-burn characterization of the Paleocene-Eocene Hanna Formation at the Hanna, Wyoming underground coal-gasification site: Hanna II Phase 1 experiment (Hanna II; post mortem examination), 8:22923 (R:US)
ROCKWELL FLASH HYDROLIEUEFACTION PROCESS
See CS-R PROCESS
ROCKY FLATS PLANT
Planning
Long-range Rocky Flats utilization study, 8:24219 (R:US)
Socio-Economic Factors
Long-range Rocky Flats utilization study, 8:24219 (R:US)
Uses
Long-range Rocky Flats utilization study, 8:24219 (R:US)
RODS (FUEL)
See FUEL RODS
ROOFS
Stability
Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls, 8:22978 (R:US)
ROOM AND PILLAR MINING
Haulage Equipment
Continuous haulage update, 8:22972 (R:US)
Mine Haulage
Continuous haulage update, 8:22972 (R:US)
Productivity
Continuous haulage update, 8:22972 (R:US)
ROOSEVELT HOT SPRINGS
Seismic Surveys
Seismic baseline and induction studies: Roosevelt Hot Springs, Utah and Raft River, Idaho, 8:23370 (R:US)
ROUS SARCOMA VIRUS
See ONCOGENIC VIRUSES
RUBBERS
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
RUBIDIUM
Ion-Atom Collisions
Target thickness and density effects for inner shell excitation in near symmetric collision-systems, 8:24544 (RA:DE:In German)
RUSSELLVILLE-2 ARKANSAS REACTOR
See ARKANSAS-2 REACTOR
RUTHENIUM
Chemistry
Behavior of ruthenium during reprocessing of spent reactor fuel, 8:23113 (TG:US)
Inventories
Byproduct inventories, 8:23171 (R:US)
Solvent Extraction
Behavior of ruthenium during reprocessing of spent reactor fuel, 8:23113 (TG:US)
Spent Fuels
Behavior of ruthenium during reprocessing of spent reactor fuel, 8:23113 (TG:US)

S

SAFEGUARDS
Safeguards Summary Event List (SSEL), 8:23195 (R:US)
SAFETY
For general aspects of safety and protection of personnel.
See also REACTOR SAFETY
Standards
The Federal Coal Mine Health program in 1976. Annual report No. 7, 8:23010 (R:US)
SAFETY (NUCLEAR)
See RADIATION PROTECTION
SAFETY (REACTOR)
See REACTOR SAFETY
SALINE ZONE
See OIL SHALES
PICEANCE CREEK BASIN
SALMONELLA TYPHIMURIUM
Biological Radiation Effects
Respiration shutoff in Escherichia coli and Salmonella typhimurium after far-uv irradiation, 8:24375 (RA:US)
SAMARIUM 142
Quadrupole Moments
Quadrupole moment of the 7^- isomer in ^{143}Sm, 8:24677 (RA:DE:In German)
SAMARIUM 152 TARGET
Oxygen 16 Reactions
Calculation of reaction cross sections for deformed nuclei, 8:24683 (RA:DE:In German, English)
SAMARIUM 154 TARGET
Krypton 86 Reactions
Bombarding energy dependence of angular momentum transfer in deep inelastic collisions, 8:24690 (J:NL)
SANDSTONES
Acoustic Measurements
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Electrical Properties
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Mineralogy
Mineralogy and petrology aspects of Mesaverde Formation at Rifle Gap, Colorado, specific to the sedimentology and gas-bearing intervals in the subsurface, 8:23060 (R:US)
Permeability
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Petrology
Mineralogy and petrology aspects of Mesaverde Formation at Rifle Gap, Colorado, specific to the sedimentology and gas-bearing intervals in the subsurface, 8:23060 (R:US)
Porosity
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Scanning Electron Microscopy
Useful technique to study particle invasion in porous media by backscattered electron imaging, 8:23015 (J:US)
Ultrasonic Testing
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
Water Saturation
Sonic and electrical properties of partially saturated tight-gas sands. Final report, 8:23050 (R:US)
SANITARY LANDFILLS
Anaerobic Digestion
Landfill gas recovery in the USA, 8:23873 (R:US)
Coverings
Computer optimization of landfill-cover design, 8:23871 (R:US)
SAVANNAH RIVER PLANT
Radioactive Waste Processing
Waste sludge composition at the Savannah River Plant, 8:23180 (J:US)
SCANDIUM IONS
Electron-Ion Collisions
Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence, 8:24554 (J:US)
SCANDIUM PHOSPHATES
Crystal Structure
Structure and conductivity of the NASICON analog $Na_3SC_2(PO_4)_3$, 8:24058 (R:US)
SCANNING ELECTRON MICROSCOPY
Imaging and analysis of surfaces using diffracted electrons, 8:24068 (BA:US)
SCATTERING
See also INELASTIC SCATTERING
LIGHT SCATTERING
SMALL ANGLE SCATTERING
Quantum Mechanics
Scattering theory in arrangement channel quantum mechanics, 8:24638 (J:US)
SCAVENGING (ATMOSPHERIC)
See WASHOUT
SCHOOL BUILDINGS
Energy Consumption
Energy conservation in Maryland public schools. Analysis of 1982 data in relation to the 1978-81 study, 8:23809 (R:US)
Energy conservation in Maryland public schools, 1978-1981, 8:23811 (R:US)
Photovoltaic Power Supplies
Experience with a grid-interactive solar photovoltaic electric system, 8:23296 (J:US)
Intermediate photovoltaic system application experiment operational performance report. Volume 14. For Beverly High School, Beverly, Massachusetts for October 1982, 8:23293 (R:US)
Intermediate photovoltaic system application experiment operational performance report. Volume 16. For Beverly High School, Beverly, MA for December 1982, 8:23295 (R:US)
Intermediate photovoltaic system application experiment operational performance report. Volume 15. For Beverly High School, Beverly, MA for November 1982, 8:23294 (R:US)
Solar Air Conditioning
Solar-energy-system performance evaluation: Irvine School (El Camino Real Elementary School) Irvine, California, October 1978-March 1979, 8:23344 (R:US)
Solar Space Heating
Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report, 8:23320 (R:US)
Solar-energy-system performance evaluation: Northview Elementary School (Howard's Grove) Howard's Grove, Wisconsin, September 1978-April 1979, 8:23346 (R:US)
Solar-energy-system performance evaluation: Page Jackson Elementary School, Charles Town, West Virginia, November 1978-March 1979, 8:23345 (R:US)
Solar-energy-system performance evaluation: Scattergood School Recreation Center, West Branch, Iowa, June 1978-April 1979, 8:23339 (R:US)
Solar-energy-system performance evaluation: Irvine School (El Camino Real Elementary School) Irvine, California, October 1978-March 1979, 8:23344 (R:US)
Solar-project cost report for Howard's Grove School, Howard's Grove, Wisconsin, 8:23347 (R:US)
Solar Water Heating
Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report, 8:23320 (R:US)
Solar-energy-system performance evaluation: Scattergood School Recreation Center, West Branch, Iowa, June 1978-April 1979, 8:23339 (R:US)
SCHOTTKY BARRIER SOLAR CELLS
Diffusion
Structural and electronic studies of defects in amorphous silicon. Report No. 3. Technical progress report, November 1981-January 1982, 8:23280 (R:US)
SCINTILLATION CHAMBERS
See SCINTILLATION COUNTERS
SCINTILLATION COUNTERS
See also LIQUID SCINTILLATION DETECTORS

Design
Facility for positron computed tomography, 8:24347 (P:DE:In German)
Research Programs
In vivo measurements of bone-seeking radionuclides. Progress report, 1981-1982 (Lead abstract), 8:24197 (R:US)
SCINTILLATION DETECTORS
See SCINTILLATION COUNTERS
SCRAM
Cooling Ponds
Analysis of a partial scram event in a typical BWR/4, 8:23653 (J:US)
Reactor Cooling Systems
Analysis of a partial scram event in a typical BWR/4, 8:23653 (J:US)
SCREW PINCH
Engineering
Engineering tests and performance of screw pinch device TPE-2, with non-circular cross-section, 8:24946 (J:US)
Performance
Engineering tests and performance of screw pinch device TPE-2, with non-circular cross-section, 8:24946 (J:US)
SEA LEVEL
Variations
Possible changes in global sea level and their potential causes, 8:24269 (R:US)
SEABROOK-1 REACTOR
Legal Aspects
Safety evaluation report: related to the operation of Seabrook Station, Units 1 and 2, Docket Nos. 50-443 and 50-444, Public Service Company of New Hampshire, et al., 8:23623 (R:US)
Reactor Safety
Safety evaluation report: related to the operation of Seabrook Station, Units 1 and 2, Docket Nos. 50-443 and 50-444, Public Service Company of New Hampshire, et al., 8:23623 (R:US)
SEABROOK-2 REACTOR
Legal Aspects
Safety evaluation report: related to the operation of Seabrook Station, Units 1 and 2, Docket Nos. 50-443 and 50-444, Public Service Company of New Hampshire, et al., 8:23623 (R:US)
Reactor Safety
Safety evaluation report: related to the operation of Seabrook Station, Units 1 and 2, Docket Nos. 50-443 and 50-444, Public Service Company of New Hampshire, et al., 8:23623 (R:US)
SEALING MATERIALS
Fluid Flow
Sealing arrangement with annular flexible disc, 8:23520 (P:US)
Liquid Metal Cooled Reactors
Sealing arrangement with annular flexible disc, 8:23520 (P:US)
SEALS
Leak Testing
Grayloc seal static tests, 8:24112 (R:US)
Performance Testing
Grayloc seal static tests, 8:24112 (R:US)
SEAWATER
AMP
Dissolved cyclic adenosine monophosphate (cAMP) in the sea and uptake of cAMP by marine bacteria, 8:24351 (J:DE)
Chemical Analysis
Fate of chlorine in seawater. Final report, August 1, 1977-January 31, 1981, 8:24268 (R:US)
Corrosive Effects
Assessment of corrosion fatigue behavior of offshore structures, 8:23904 (RA:US)
Fatigue of welded structural steel in sea water, 8:23905 (RA:US)
Sea water corrosion of two-phase Cu-10Ni-8Sn, 8:23897 (RA:US)
SEBACEOUS GLANDS
See SKIN
SECONDARY BATTERIES
See ELECTRIC BATTERIES
SECONDARY EMISSION
Computer Codes
CONDYN; Polya model secondary electron spectra (CDC6600,7600; FORTRAN IV), 8:24510 (R:US)
SECONDARY RECOVERY
See ENHANCED RECOVERY
SECURITY VIOLATIONS
Public access to classified reports at the Los Alamos Scientific Laboratory, 8:25282 (R:US)
SEDIMENTS
Biogeochemistry
Temporal trends in the pH of Woods, Sagamore, and Panther Lakes as determined by an analysis of diatom population, 8:24287 (RA:US)
Environmental Transport
Long-term simulation of sediment and contaminant transport, 8:24291 (R:US)
Geochemical Surveys
Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23098 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R:US)
Mineralogy
Summary of observations from the investigation of the sediments of Panther, Sagamore and Woods, 8:24286 (RA:US)
PH Value
Summary of observations from the investigation of the sediments of Panther, Sagamore and Woods, 8:24286 (RA:US)
SEISMIC DETECTION
Data Analysis
Analysis of seismic data at RSTN sites and high-frequency seismic signals at TFSO, 8:24494 (R:US)
SEISMIC DETECTORS
Performance
Analysis of seismic data at RSTN sites and high-frequency seismic signals at TFSO, 8:24494 (R:US)
SEISMIC SURVEYS
Seismic S Waves
Registration of shear waves, 8:24486 (R:DE:In German)
Telemetry
Development of a telemetry system for seismic application, 8:23012 (R:DE:In German)
SEISMIC WAVES
Wave Propagation
Investigations of near-source structural effects on body waves. Part II. Yucca Flats; receiver functions appropriate to NTS; motive functional specifications. Annual technical report, 8:24221 (R:US)
SELENIUM
Ion-Atom Collisions
Target thickness and density effects for inner shell excitation in near symmetric collision-systems, 8:24544 (RA:DE:In German)
Removal
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
SELENIUM IONS
Emission Spectra
Spectra of germanium and selenium in the 50-350 A region from the PLT tokamak plasma, 8:24770 (R:US)
SELF-POTENTIAL SURVEYS
Two-Dimensional Calculations
SPXCPL; two-dimensional modeling of self-potential effects (PRIME400;DEC VAX11/780; FORTRAN IV), 8:23366 (R:US)

SELF-POWERED NEUTRON DETECTORS
Efficiency
Improved program for the determination of neutron efficiency of large Self Powered Neutron Detectors taking into account charge carrier production in the insulator, 8:24204 (R:DE:In German)
SELF-SERVE STATIONS
See GASOLINE SERVICE STATIONS
SEM (MICROSCOPY)
See SCANNING ELECTRON MICROSCOPY
SEMICONDUCTOR COUNTERS
See SEMICONDUCTOR DETECTORS
SEMICONDUCTOR DETECTORS
Charge-Coupled Devices
Detection of minimum ionizing particles with a charge coupled device, 8:24206 (J:NL)
SENIOR CENTERS
See PUBLIC BUILDINGS
SENSIBLE HEAT STORAGE
Optimization
Optimization of heat storage systems using silica gels. Final report, 8:23665 (R:US)
SEPTUM MAGNETS
Magnetic Shielding
Shielded beam channel septum magnet, 8:24193 (J:US)
SERI
See SOLAR ENERGY RESEARCH INSTITUTE
SERUM (IMMUNE)
See IMMUNE SERUMS
SERVICE STATIONS
See GASOLINE SERVICE STATIONS
SHAFT EXCAVATIONS
Comparative Evaluations
Evaluation of alternative shaft-sinking techniques for high-level nuclear waste (HLW) deep geologic repositories. Final report (Task 3), June 1981-July 1982, 8:23150 (R:US)
SHALE MINING
See OIL SHALE MINING
SHALE OIL
Chemical Analysis
Occurrence of biomarkers in Green River shale oil (Isoprenoids and polycycloalkanes), 8:23086 (R:US)
Chemical Composition
Comparative study of the combustion of alternate liquid fuels, 8:22994 (R:US)
Combustion Properties
Comparative study of the combustion of alternate liquid fuels, 8:22994 (R:US)
Skin Absorption
Dermal Pathology Program, 8:24446 (RA:US)
Toxicity
Dermal Pathology Program, 8:24446 (RA:US)
SHAPED CHARGES
Prior to August 1979 CHEMICAL EXPLOSIVES and SHAPE were used.
Detonations
Shaped-charge penetration in concrete: a unified approach, 8:24218 (R:US)
SHEATHS (FUEL)
See FUEL CANS
SHELLS
Structural forms; for electron shells in atoms use ELECTRONIC STRUCTURE.
Dynamics
Simple ablative implosion model: shell dynamics, 8:24849 (J:US)
Implosions
Simple ablative implosion model: shell dynamics, 8:24849 (J:US)
Stress Analysis
CURT2; curved tubes or elbows & attached pipes (IBM360,370; FORTRAN IV), 8:24084 (R:US)
SHELLS (CONTAINMENT)
See CONTAINMENT SHELLS
SHF RADIATION
See RADIOWAVE RADIATION
SHIELDING
Design
Doublet III vessel wall protection for 7 MW neutral beam heated plasma operation, 8:24968 (J:US)
Neutron Transport
DEMONR; unbiased Monte Carlo slab shield code (IBM360/65; FORTRAN IV), 8:24716 (R:US)
Point Kernels
PELSHIE2; point kernel integration shielding (IBM360,303x; FORTRAN IV (99%) and BAL (1%)), 8:24720 (R:US)
SHIELDING MATERIALS
Neutron Transport
SPAR1; shielding with analytic ray-tracing (CDC6600,7600; FORTRAN IV), 8:24719 (R:US)
Photon Transport
SPAR1; shielding with analytic ray-tracing (CDC6600,7600; FORTRAN IV), 8:24719 (R:US)
SHIELDS
See also THERMAL SHIELDS
Design
Elmo Bumpy Torus-reactor first wall/blanket shield (FWBS) design, 8:24972 (J:US)
Electromagnetic Radiation
FELIX: an experimental facility to study electromagnetic effects for first wall, blanket, and shield systems, 8:24970 (J:US)
Test Facilities
FELIX: an experimental facility to study electromagnetic effects for first wall, blanket, and shield systems, 8:24970 (J:US)
The FELIX experimental program and future upgrades, 8:24971 (J:US)
SHIPPINGPORT PRESSURIZED WATER REACTOR
See SHIPPINGPORT REACTOR
SHIPPINGPORT REACTOR
Reactor Operation
Shippingport Atomic Power Station. Quarterly operating report, fourth quarter 1982, 8:23470 (R:US)
SHIPS
Boiler Fuels
A study of the total cost of conventional ship propulsion fuel. Final report FY 1980, 8:23030 (R:US)
SHORT ROTATION CULTIVATION
Mathematical Models
Analysis of short-rotation forests using the Argonne model for selecting economic strategy (MOSES), 8:23256 (R:US)
SHOTFIRING
See EXPLOSIVE FRACTURING
SHOWER COUNTERS
Detects high energy gamma radiation or high energy particles on basis of cascade showers in layered absorbers.
Noise
Radioactively induced noise in gas-sampling uranium calorimeters, 8:24195 (R:US)
SHUTDOWN (REACTOR)
See REACTOR SHUTDOWN
SI UNITS
Conversion
DWG100RQ;DWG101RQ; convert to or from SI units (IBM360,370,303x; FORTRAN IV (85%) and COBOL Version 4 (15%)), 8:25245 (R:US)
SIALON
See ALUMINIUM OXIDES
SILICON NITRIDES
SILICA
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Chemical Reactions
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R:US)
Corrosion
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R:US)

SILICA GEL
Sensible Heat Storage
Optimization of heat storage systems using silica gels. Final report, 8:23665 (R:US)
SILICON
Amorphous State
Preparation of in situ doped hydrogenated amorphous silicon by homogeneous chemical vapor deposition, 8:24036 (J:US)
Crystal Doping
Low-Cost Solar-Array Project: cell and module formation research area. Process research of non-CZ silicon material. Quarterly report No. 4, December 1, 1982-February 28, 1983, 8:23269 (R:US)
Crystal Growth
Large-area sheet task: advanced dendritic-web-growth development. Annual report, October 23, 1981-October 22, 1982 (RIBBON), 8:23267 (R:US)
Cutting
LSA large area silicon sheet task enhanced I.D. slicing. Quarterly report No. 7, July-September 1980, 8:23266 (R:US)
Electron Channeling
Electron-channeling radiation: x-ray source feasibility study, 8:24729 (R:US)
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
Electronic Structure
Self-consistent electronic structure of realistic models of amorphous hydrogenated silicon, 8:24039 (J:US)
Hydrogenation
Effects of ion beam hydrogenation on silicon solar cell structures, 8:23284 (J:CH)
Preparation of in situ doped hydrogenated amorphous silicon by homogeneous chemical vapor deposition, 8:24036 (J:US)
Self-consistent electronic structure of realistic models of amorphous hydrogenated silicon, 8:24039 (J:US)
Ion Implantation
Megavolt arsenic implantation into silicon, 8:24042 (J:CH)
Irradiation
Time-resolved optical studies of silicon during nanosecond pulsed-laser irradiation, 8:24038 (J:US)
Microstructure
Small angle neutron scattering study of structural heterogeneities in -Si:H, 8:23261 (R:FR)
Optical Properties
Time-resolved optical studies of silicon during nanosecond pulsed-laser irradiation, 8:24038 (J:US)
Paramagnetism
Electron spin resonance study of radiation-induced electrically active paramagnetic centers at the Si/SiO_2 interface, 8:24035 (J:US)
Phonons
Effect of geometric deformation of tetrahedral bonding on the vibrational properties of Group-IV semiconductors: Si in the BC-8 structure, 8:24037 (J:US)
Photoluminescence
Time-resolved optical studies of silicon during nanosecond pulsed-laser irradiation, 8:24038 (J:US)
Positron Channeling
Investigation of radiation from channeled electrons and positrons. Final report, September 1, 1978-August 31, 1981, 8:24723 (R:US)
Small Angle Scattering
Small angle neutron scattering study of structural heterogeneities in -Si:H, 8:23261 (R:FR)
Spectra
Effect of geometric deformation of tetrahedral bonding on the vibrational properties of Group-IV semiconductors: Si in the BC-8 structure, 8:24037 (J:US)
SILICON CARBIDES
Corrosion
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R:US)
Pressing
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Sintering
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Thermal Conductivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
Thermal Diffusivity
Effect of microcracking on the conduction of heat in brittle composites, 8:24016 (RA:US)
Whiskers
Production and characterization of beta-silicon carbide and alpha-silicon nitride whiskers for ceramic matrix composites, 8:24005 (R:US)
SILICON IONS
Energy-Level Transitions
Beam-foil spectroscopy at Argonne National Laboratory, 8:24517 (R:US)
Ion Spectroscopy
Beam-foil spectroscopy at Argonne National Laboratory, 8:24517 (R:US)
Ion-Atom Collisions
L-shell excitation of Si and Ar in collisions of 35 to 400 keV Si^+ on Ar, 8:24540 (RA:DE:In German)
Target thickness and density effects for inner shell excitation in near symmetric collision-systems, 8:24544 (RA:DE:In German)
SILICON NITRIDES
Chemical Vapor Deposition
Hydrogen-implanted silicon nitride, 8:24011 (J:US)
Corrosion
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R:US)
Creep
High temperature properties of Si_3N_4, 8:23994 (R:DE:In German)
Theoretical estimate of solution-precipitation creep in MgO-fluxed Si/sub 3/N/sub 4/, 8:24012 (J:US)
Fabrication
Oxidation stability of advanced reaction-bonded Si/sub 3/N/sub 4/ materials, 8:24014 (J:US)
Hot Pressing
Theoretical estimate of solution-precipitation creep in MgO-fluxed Si/sub 3/N/sub 4/, 8:24012 (J:US)
Ion Implantation
Hydrogen-implanted silicon nitride, 8:24011 (J:US)
Oxidation
Oxidation stability of advanced reaction-bonded Si/sub 3/N/sub 4/ materials, 8:24014 (J:US)
Whiskers
Production and characterization of beta-silicon carbide and alpha-silicon nitride whiskers for ceramic matrix composites, 8:24005 (R:US)
SILICON OXIDES
See also QUARTZ
SILICA
Paramagnetism
Electron spin resonance study of radiation-induced electrically active paramagnetic centers at the Si/SiO_2 interface, 8:24035 (J:US)
SILICON SOLAR CELLS
Diffusion
Effect of lithium diffusion into polycrystalline Si solar cells, 8:23288 (J:US)
Energy Levels
Effect of lithium diffusion into polycrystalline Si solar cells, 8:23288 (J:US)
Fabrication
Structural and electronic studies of defects in amorphous silicon. Report No. 3. Technical progress report, November 1981-January 1982, 8:23280 (R:US)
Performance
Structural and electronic studies of defects in amorphous silicon. Report No. 3. Technical progress report, November 1981-January 1982, 8:23280 (R:US)

Physical Radiation Effects
Effects of ion beam hydrogenation on silicon solar cell structures, 8:23284 (J:CH)
Production
Module experimental process system development unit (MEPSDU). Summary technical report, November 26, 1980-February 23, 1982, 8:23268 (R:US)
Recombination
Effect of lithium diffusion into polycrystalline Si solar cells, 8:23288 (J:US)

SILICONES
Mechanical Properties
Material properties for TR-55 and silicone elastomeric cushions, 8:24033 (R:US)

SILVER
Electric Conductivity
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R:US)
Ion-Atom Collisions
Observation of the recoil effect on the K-shell excitation probabilities in ion-atom collisions, 8:24543 (RA:DE:In German)
Rotationally induced L-shell excitation in energetic Ag + Ag and Ag + Cs collisions, 8:24536 (RA:DE:In German)
Magnetic Properties
Magnetic-property changes in epitaxial metal-film sandwiches, 8:23949 (R:US)
Superconductivity
Superconductivity in Au-Cr-Au and Ag-Pd-Ag epitaxial metal film sandwiches, 8:23944 (R:US)

SILVER 109 TARGET
Argon 40 Reactions
Measurement of neutron multiplicity distributions with scintillator tank, 8:24198 (RA:DE:In German)

SILVER IODIDES
Crystal-Phase Transformations
Molecular dynamics studies of superionic conductors, 8:24031 (R:US)
Ionic Conductivity
Molecular dynamics studies of superionic conductors, 8:24031 (R:US)

SILVER IONS
Ion-Atom Collisions
Rotationally induced L-shell excitation in energetic Ag + Ag and Ag + Cs collisions, 8:24536 (RA:DE:In German)

SIMS
See MASS SPECTROSCOPY

SISTER CHROMATID EXCHANGES
Kinetics
Kinetics of mutation and sister-chromatid exchange induction by ethyl methanesulfonate in Chinese hamster ovary cells, 8:24476 (J:NL)

SKELETON
Genetic Radiation Effects
Studies on the induction of dominant skeletal mutations by radiation (X radiation and gamma radiation), 8:24383 (RA:US)
Low Dose Irradiation
Risk estimates for bone, 8:24363 (R:US)

SKIN
Biological Radiation Effects
Radiation carcinogenesis (Neutrons, ultraviolet radiation), 8:24388 (RA:US)

SLAGS
Fluid Flow
COMRC1; slag transport models for MHD systems (IBM360,370,303x; FORTRAN IV), 8:23766 (R:US)
SLGTR; slag transport models for duct surfaces (IBM360,370; FORTRAN IV), 8:23764 (R:US)

SLOT OVENS
See COKE OVENS

SLUDGES
Chemical Composition
Waste sludge composition at the Savannah River Plant, 8:23180 (J:US)

SLUGS (FUEL)
See FUEL RODS

SLURRIES (FUEL)
See FUEL SLURRIES

SMALL ANGLE SCATTERING
Measuring Instruments
National Center for Small-Angle Scattering Research, 8:24732 (BA:US)
Research Programs
National Center for Small-Angle Scattering Research, 8:24732 (BA:US)

SMALL-SCALE HYDROELECTRIC POWER PLANTS
Appropriate technologies for basic energy needs in rural India. Working paper, 8:23759 (R:US)
Hydraulic Turbines
Sample survey of traditional water wheels and small water turbines in nepal: a preliminary report, 8:23242 (R:US)
Water Wheels
Sample survey of traditional water wheels and small water turbines in nepal: a preliminary report, 8:23242 (R:US)

SMELTING
Air Pollution Abatement
Environmental pollution control at the AMAX-Homestake lead smelter, 8:24245 (J:US)
Environmental Effects
Heavy metals in the environs of a smelter, 8:24292 (J:US)

SMES
See SUPERCONDUCTING MAGNETIC ENERGY STORAGE

SMOKE DETECTORS
Performance
Fire tests in ventilated rooms: detection of cable-tray and exposure fires, 8:23420 (R:US)

SO-4 GROUPS
Irreducible Representations
Relations between irreducible representations of the hyperoctahedral group and O(4) and SO(4), 8:24630 (R:DE)

SODIUM
Entropy
Predissociation in an intense electromagnetic field, 8:24754 (J:US)
Fires
SOMIX1; sodium spray fires in cylindrical cell (IBM370; FORTRAN IV H Extended), 8:23508 (R:US)
Free Energy
Predissociation in an intense electromagnetic field, 8:24754 (J:US)
Thermochemical Heat Storage
Energy storage via the carbothermic reduction of sodium oxide, 8:23667 (R:US)
Thermodynamic Properties
Calculation of thermophysical properties of sodium, 8:23516 (R:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)

SODIUM 22
Hyperfine Structure
Hyperfine field at ^{22}Na in nickel, 8:23959 (RA:DE:In German)

SODIUM BROMIDES
Corrosive Effects
Stress corrosion of type 304 steel in H_2SO_4 alkali halide environments, 8:23912 (RA:US)

SODIUM CHLORIDES
Corrosive Effects
Corrosion behavior of high density tungsten alloys, 8:23899 (RA:US)
Environmental effects on fatigue crack initiation and early propagation, 8:23907 (RA:US)
Stress corrosion of type 304 steel in H_2SO_4 alkali halide environments, 8:23912 (RA:US)
Crystal Defects
Charge transfer complexes of molecular oxygen in $NaClO_3$ and $KClO_3$ studied by resonance Raman and infrared spectroscopy, 8:24061 (J:US)
Photolysis
Charge transfer complexes of molecular oxygen in $NaClO_3$ and $KClO_3$ studied by resonance Raman and infrared spectroscopy, 8:24061 (J:US)

Sintering
Influence of particle size on the sintering kinetics of ultrapure sodium chloride, 8:24043 (J:US)
SODIUM FLUORIDES
Corrosive Effects
Stress corrosion of type 304 steel in H_2SO_4 alkali halide environments, 8:23912 (RA:US)
SODIUM IODIDE DETECTORS
See NAI DETECTORS
SODIUM IODIDES
Corrosive Effects
Stress corrosion of type 304 steel in H_2SO_4 alkali halide environments, 8:23912 (RA:US)
SODIUM MINERALS
See MINERALS
SODIUM OXIDES
Reduction
Energy storage via the carbothermic reduction of sodium oxide, 8:23667 (R:US)
Thermochemical Heat Storage
Energy storage via the carbothermic reduction of sodium oxide, 8:23667 (R:US)
SODIUM PHOSPHATES
Crystal Structure
Structure and conductivity of the NASICON analog $Na_3SC_2(PO_4)_3$, 8:24058 (R:US)
Ionic Conductivity
PHOS1; pH & conductivity of sodium phosphate solutions (DEC10; BASIC), 8:24055 (R:US)
SODIUM SILICATES
Electronic Structure
XPS study of CaO in sodium silicate glass, 8:24030 (R:US)
Molecular Structure
XPS study of CaO in sodium silicate glass, 8:24030 (R:US)
SODIUM SULFATES
Phase Diagrams
Thermodynamics of molten sulfate mixtures, 8:24066 (J:US)
SOILING
See SURFACE CONTAMINATION
SOILS
Classification
Mineralogy of the ILWAS lake-watering, 8:24499 (RA:US)
Environmental Transport
ODMOD; soil-water trace-containment transport (IBM360,370; FORTRAN IV (97%) and BAL (3%)), 8:24274 (R:US)
Hanford Reservation
Field and laboratory evaluation of the mobility of cobalt-60/EDTA in an arid environment, 8:23167 (R:US)
Radionuclide Migration
Field and laboratory evaluation of the mobility of cobalt-60/EDTA in an arid environment, 8:23167 (R:US)
Radionuclide migration of the elements I, Sr, Cs and Ce in subsurface loose rocks, 8:24263 (R:DE:In German)
Sorptive Properties
Field and laboratory evaluation of the mobility of cobalt-60/EDTA in an arid environment, 8:23167 (R:US)
X-Ray Diffraction
Mineralogy of the ILWAS lake-watering, 8:24499 (RA:US)
SOLAR ABSORBERS
Thermal Efficiency
Sp-c12-301: thermal performances of solar energy absorbers, 8:23354 (R:US:SW)
SOLAR AIR CONDITIONING
Demonstration Programs
Instrumented solar-demonstration systems. Project description summaries, January 1979, 8:23327 (R:US)
SOLAR AIR HEATERS
Design
Plastic solar air heaters of a novel design, 8:23352 (R:DE)
Performance
Plastic solar air heaters of a novel design, 8:23352 (R:DE)
Testing
Plastic solar air heaters of a novel design, 8:23352 (R:DE)
SOLAR BATTERIES
See SOLAR CELL ARRAYS
SOLAR CELL ARRAYS
Environmental Impacts
Photovoltaic energy systems: environmental concerns and control technology needs, 8:23277 (R:US)
SOLAR CELL RECEIVERS
See SOLAR RECEIVERS
SOLAR CELLS
See also SCHOTTKY BARRIER SOLAR CELLS
SILICON SOLAR CELLS
Environmental Impacts
Photovoltaic energy systems: environmental concerns and control technology needs, 8:23277 (R:US)
Performance Testing
High-power I-V curve tracer employing a capacitive load, 8:23265 (R:US)
Spectral Response
Extensive modeled terrestrial solar spectral data sets with solar-cell analysis, 8:23281 (R:US)
SOLAR COLLECTORS
See also CONCENTRATING COLLECTORS
FLAT PLATE COLLECTORS
SOLAR AIR HEATERS
SOLAR PONDS
Laminar Flow
Laminar natural convection in an inclined rectangular box with the lower surface half heated and half insulated, 8:23350 (R:US)
Natural Convection
Laminar natural convection in an inclined rectangular box with the lower surface half heated and half insulated, 8:23350 (R:US)
SOLAR COOLING SYSTEMS
Bibliographies
Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975, 8:23323 (R:US)
Performance
Solar-energy-system performance evaluation. Reedy Creek Utility District office building, Lake Buena Vista, Florida, September 1978-February, 1979, 8:23343 (R:US)
Solar-energy-system performance evaluation: Irvine School (El Camino Real Elementary School) Irvine, California, October 1978-March 1979, 8:23344 (R:US)
Thermal performance of space-cooling solar-energy systems in the National Solar Data Network, 8:23328 (R:US)
Standards
Performance criteria for solar heating and cooling systems in residential buildings. Building science series (final), 8:23325 (R:US)
SOLAR DOMESTIC WATER HEATING
See SOLAR WATER HEATING
SOLAR ENERGY
Appropriate technologies for basic energy needs in rural India. Working paper, 8:23759 (R:US)
Bibliographies
Solar Energy Update: a current awareness journal, 8:23246 (R:US)
Technology Utilization
1981 Active-Solar-Installations Survey, 8:23758 (R:US)
SOLAR ENERGY RESEARCH INSTITUTE
Performance
Performance accountability in the biomass energy systems program, 8:23254 (R:US)
Program Management
Costly delays in the purchase of a scientific computer for the Solar Energy Research Institute, 8:25227 (R:US)
Research Programs
Solar Energy Research Institute's daylighting laboratory, 8:23827 (R:US)
SOLAR EQUIPMENT
See also HELIOSTATS
PHOTOELECTROCHEMICAL CELLS
PHOTOVOLTAIC POWER SUPPLIES
SOLAR ABSORBERS
SOLAR CELL ARRAYS
SOLAR CELLS
SOLAR COLLECTORS
SOLAR COOLING SYSTEMS
SOLAR HEATING SYSTEMS
SOLAR WATER HEATERS

Borosilicate Glass
Effect of fining agents on the solarization of a borosilicate glass, 8:23355 (J:US)

SOLAR HEATING SYSTEMS
See also PASSIVE SOLAR HEATING SYSTEMS
SOLAR-ASSISTED HEAT PUMPS

Bibliographies
Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975, 8:23323 (R:US)

Computerized Simulation
Development of a thermal storage system based on the heat of absorption in hygroscopic materials. Final report, 8:23359 (R:US)

Corrosion
Corrosion problems associated with solar fluid and components, 8:23315 (R:US)

Cost
Solar-project cost report for Howard's Grove School, Howard's Grove, Wisconsin, 8:23347 (R:US)

Design
Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report, 8:23320 (R:US)

Energy Analysis
Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses, 8:23796 (R:DE:In German)

Engineering Drawings
Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report, 8:23320 (R:US)

Latent Heat Storage
Latent heat storage for solar energy systems, 8:23357 (R:XE:GE)

Performance
Comparative report of solar heating system performance, 8:23349 (J:US)
FCHART/SLR2.0; solar heating system performance (DEC20;DEC VAX11/780; FORTRAN 77), 8:23311 (R:US)
Solar-energy-system-performance evaluation: Perl-Mack Enterprises, Inc., single-family residence, Denver, Colorado, April 1978-March 1979, 8:23332 (R:US)
Solar-energy-system performance evaluation: Montecito Pines apartment complex, Santa Rosa, California, November 1978-March 1979, 8:23335 (R:US)
Solar-energy-system performance evaluation. Concord Light Plant municipal garage and office building, Concord, Massachusetts, November 1978-March 1979, 8:23348 (R:US)
Solar-energy-system performance evaluation: Terrell D. Moseley office building, Lynchburg, Virginia, October 1978-March 1979, 8:23341 (R:US)
Solar-energy-system performance evaluation: Ortiz and Reill Developers, Inc., Lot 8 single-family residence, Escondido, California, October 1978-March 1979, 8:23338 (R:US)
Solar-energy-system performance evaluation: Alpha Construction Co. single-family residence, Canton, Ohio, October 1978-March 1979, 8:23333 (R:US)
Solar-energy-system performance evaluation. Reedy Creek Utility District office building, Lake Buena Vista, Florida, September 1978-February, 1979, 8:23343 (R:US)
Solar-energy-system performance evaluation: Rademaker Corporation office and warehouse building, Louisville, Kentucky, October 1978-March 1979, 8:23340 (R:US)
Solar-energy-system performance evaluation: Northview Elementary School (Howard's Grove) Howard's Grove, Wisconsin, September 1978-April 1979, 8:23346 (R:US)
Solar-energy-system performance evaluation: Page Jackson Elementary School, Charles Town, West Virginia, November 1978-March 1979, 8:23345 (R:US)
Solar-energy-system performance evaluation: Washington Natural Gas Company, Kirkland, Washington, January 1979-March 1979, 8:23330 (R:US)
Solar-energy-system performance evaluation: J. D. Evans, Inc., House B, Columbia, Maryland, November 1978-March 1979, 8:23331 (R:US)
Solar-energy-system performance evaluation: Blakedale Professional Center Office Suite, Greenwood, South Carolina, October 1978-March 1979, 8:23342 (R:US)
Solar-energy-system performance evaluation: Scattergood School Recreation Center, West Branch, Iowa, June 1978-April 1979, 8:23339 (R:US)
Solar-energy-system performance evaluation: Irvine School (El Camino Real Elementary School) Irvine, California, October 1978-March 1979, 8:23344 (R:US)
Thermal-performance analysis of space-heating systems in the National Solar Data Network, 8:23329 (R:US)

Performance Testing
Corona del Sol High School solar system, Tempe Union High School District No. 213. Final technical report, 8:23320 (R:US)
Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system, 8:23351 (R:DE:In German)

Standards
Performance criteria for solar heating and cooling systems in residential buildings. Building science series (final), 8:23325 (R:US)

Tanks
Storing solar energy in thermally stratified tanks, 8:23356 (R:US)

Thermal Energy Storage Equipment
SOLTES1; thermal energy systems simulation (CDC6600,7600; FORTRAN IV (99%) and COMPASS (1%)), 8:23663 (R:US)

SOLAR ONE POWER PLANT
See BARSTOW SOLAR PILOT PLANT

SOLAR PONDS

Economic Analysis
Technical and economic feasibility of salt-gradient solar ponds at the Truscott Brine Lake of the Red River Chloride Control Project. A report to the House-Senate Committee on Appropriations of the Ninety-Seventh Congress, 8:23306 (R:US)

Feasibility Studies
Technical and economic feasibility of salt-gradient solar ponds at the Truscott Brine Lake of the Red River Chloride Control Project. A report to the House-Senate Committee on Appropriations of the Ninety-Seventh Congress, 8:23306 (R:US)

SOLAR POWER PLANTS
See also OCEAN THERMAL POWER PLANTS
PHOTOVOLTAIC POWER PLANTS
SOLAR THERMAL POWER PLANTS

Technology Assessment
Energy technology data handbook. Vol. 1, 8:23423 (R:DE)

SOLAR PROCESS HEAT

Bibliographies
Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975, 8:23323 (R:US)

Economics
Economies of scale in the production of steam with solar thermal-fossil boiler hybrid systems, 8:23253 (R:US)

Technology Assessment
System study on the possibilities of intensified use of solar energy in the Federal Republic of Germany (FRG), 8:23312 (R:DE:In German)

SOLAR RADIATION

Spectra
Extensive modeled terrestrial solar spectral data sets with solar-cell analysis, 8:23281 (R:US)

SOLAR RECEIVERS
See also CENTRAL RECEIVERS

Performance Testing
Solar thermochemical energy conversion and transport. Final report 15 Mar 77-30 Sep 82, 8:23255 (R:US)

Thermochemical Processes
Solar thermochemical energy conversion and transport. Final report 15 Mar 77-30 Sep 82, 8:23255 (R:US)

SOLAR SEA POWER PLANTS
See OCEAN THERMAL POWER PLANTS

SOLAR SPACE HEATING
Study of the effect that building insulation has on the actual fuel consumption. Final report, 8:23322 (R:XE:FR)

Demonstration Programs
Instrumented solar-demonstration systems. Project description summaries, January 1979, 8:23327 (R:US)
Technology Assessment
System study on the possibilities of intensified use of solar energy in the Federal Republic of Germany (FRG), 8:23312 (R:DE:In German)

SOLAR THERMAL POWER PLANTS
See also DISTRIBUTED COLLECTOR POWER PLANTS
TOWER FOCUS POWER PLANTS
Bibliographies
Solar thermal energy utilization: a bibliography with abstracts. Quarterly update, April-June 1975, 8:23323 (R:US)
Economic Analysis
Technical and economic feasibility of salt-gradient solar ponds at the Truscott Brine Lake of the Red River Chloride Control Project. A report to the House-Senate Committee on Appropriations of the Ninety-Seventh Congress, 8:23306 (R:US)
Feasibility Studies
Renewable energy system feasibility study. Final report 2 Sep 80-30 Apr 82, 8:23252 (R:US)
Technical and economic feasibility of salt-gradient solar ponds at the Truscott Brine Lake of the Red River Chloride Control Project. A report to the House-Senate Committee on Appropriations of the Ninety-Seventh Congress, 8:23306 (R:US)
Heliostats
Heliostat field layout for solar thermal power plants, 8:23304 (R:US)
Optimization
10 kW - solar power station and power plant optimizing, 8:23298 (R:DE:In German)
Performance Testing
10 kW - solar power station and power plant optimizing, 8:23298 (R:DE:In German)
Rankine Cycle Power Systems
STESEP; solar total energy system evaluation (CDC6600,7600;IBM370; FORTRAN IV), 8:23297 (R:US)
Technology Assessment
System study on the possibilities of intensified use of solar energy in the Federal Republic of Germany (FRG), 8:23312 (R:DE:In German)

SOLAR THERMAL RECEIVERS
See SOLAR RECEIVERS

SOLAR WATER HEATERS
See also PASSIVE SOLAR WATER HEATERS
Computerized Simulation
Analytical investigations of the relative solar rating concept. Final report. Report Number FSEC 80-6, 8:23319 (R:US)
Design
Development of an advanced solar augmented water heater. Final report Feb 80-May 82, 8:23324 (R:US)
Performance Testing
Analytical investigations of the relative solar rating concept. Final report. Report Number FSEC 80-6, 8:23319 (R:US)
Measuring program for hot water supply in prefabricated houses using solar energy, 8:23313 (R:DE:In German)

SOLAR WATER HEATING
Use for solar domestic water heating; not for process hot water.
Demonstration Programs
Instrumented solar-demonstration systems. Project description summaries, January 1979, 8:23327 (R:US)
Technology Assessment
System study on the possibilities of intensified use of solar energy in the Federal Republic of Germany (FRG), 8:23312 (R:DE:In German)

SOLAR WIND
Energy Transfer
Theory of the auroral magnetosphere, 8:24509 (R:US)

SOLAR-ASSISTED HEAT PUMPS
Computerized Simulation
Correlation of FCHART 4.0 with solar/heat-pump systems, 8:23317 (R:US)
TRNSYS/GROCS simulation of the TECH House I ground-coupled-series solar-assisted heat-pump system, 8:23318 (R:US)
Performance
Correlation of FCHART 4.0 with solar/heat-pump systems, 8:23317 (R:US)
TRNSYS/GROCS simulation of the TECH House I ground-coupled-series solar-assisted heat-pump system, 8:23318 (R:US)

SOLENOIDS
Design
Design, construction, and test of a 113-mm bore solenoid with NbTi cable-in-conduit superconducting windings, 8:24126 (J:US)
Fabrication
Design, construction, and test of a 113-mm bore solenoid with NbTi cable-in-conduit superconducting windings, 8:24126 (J:US)
Stress Analysis
On mechanical stresses in solenoids constructed of transversely isotropic materials, 8:25002 (J:US)
Testing
Design, construction, and test of a 113-mm bore solenoid with NbTi cable-in-conduit superconducting windings, 8:24126 (J:US)

SOLID ELECTROLYTES
Fabrication
New method for the preparation of fast-conducting, reactive-glass systems, 8:24029 (R:US)

SOLID STATE LASERS
See also NEODYMIUM LASERS
Cost
Physics of laser fusion. Volume IV. The future development of high-power solid-state laser systems, 8:24844 (R:US)
Efficiency
Physics of laser fusion. Volume IV. The future development of high-power solid-state laser systems, 8:24844 (R:US)
Reviews
Physics of laser fusion. Volume IV. The future development of high-power solid-state laser systems, 8:24844 (R:US)

SOLID WASTES
See also WOOD WASTES
Chemical Composition
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Chemical Properties
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Leaching
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Physical Properties
Comparison of solid wastes from coal combustion and pilot coal-gasification plants. Final report, 8:22955 (R:US)
Production
Fuel of MSW, 8:23217 (R:DE:In German)

SOLIDS
Deformation
NIKE2D: a vectorized, implicit, finite-deformation, finite-element code for analyzing the static and dynamic response of 2-D solids, 8:24143 (R:US)
Tensile Properties
NIKE2D: a vectorized, implicit, finite-deformation, finite-element code for analyzing the static and dynamic response of 2-D solids, 8:24143 (R:US)

SOLITONS
Annihilation
Breather annihilation by simple dissipation, 8:24755 (J:US)

SOLUTES
Adsorption
Study of the physical-chemical mechanisms and variables which affect the transport of inorganic and organic microcontaminants in heterogeneous systems. Technical progress report, 1 July 1980-1 July 1983, 8:24279 (R:US)

SOLUTION MINING
License Applications
Standard format and content of license applications, including environmental reports, for in-situ uranium solution mining, 8:23102 (R:US)

SOLVENT EXTRACTION
Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R:US)
SOLVENT-REFINED COAL PROCESS
See SRC PROCESS
SOLVENT-REFINING COAL PLANTS
See COAL PREPARATION PLANTS
SRC PROCESS
SOMATIC MUTATIONS
Genetics
Transposable elements and genetic instabilities in crop plants, 8:24339 (J:US)
SOOT
Chemical Reaction Yield
Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels. Progress report, February 16, 1982-February 15, 1983, 8:24082 (R:US)
Diffusion
Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels. Progress report, February 16, 1982-February 15, 1983, 8:24082 (R:US)
Particle Size
Diffusion-flame studies of the chemical and physical mechanisms of soot formation from aromatic and substituted-aromatic fuels. Progress report, February 16, 1982-February 15, 1983, 8:24082 (R:US)
SOUND
See SOUND WAVES
SOUND WAVES
Scattering
Acoustic scattering by elastic solid cylinders and spheres in viscous fluids, 8:24753 (J:US)
SOUTH ATLANTIC BIGHT
Oceanography
Continental Shelf processes affecting the oceanography of the South Atlantic Bight. Progress report, June 1978-November 1981, 8:24502 (R:US)
SOUTH CAROLINA
Wind
Spectral scales in the atmospheric boundary layer, 8:24253 (J:US)
SOUTH KOREA
See REPUBLIC OF KOREA
SOVIET UNION
See USSR
SOYBEAN PLANT
See GLYCINE HISPIDA
SOYBEANS
Productivity
Ozone impacts on the productivity of selected crops (Corn, wheat, soybean and peanut crops), 8:24403 (R:US)
SPACE LATTICES
See CRYSTAL LATTICES
SPACECRAFT POWER SUPPLIES
Radioisotope Heat Sources
Flight-systems safety program, September 1982. Progress report, 8:23202 (R:US)
SPAIN
Research Programs
Optimum conditions (technical and economic) for steel industry coke, 8:22932 (R:MX:In Spanish)
SPECTRAL FUNCTIONS
Time-Series Analysis
MESA; maximum entropy time series analysis (IBM360,370; FORTRAN IV), 8:25250 (R:US)
SPECTRAL SHIFT CONTROL
Extending BWR burnup with spectral shift control, 8:23535 (RA:US)
SPENT FUEL CASKS
Impact Tests
Study and full-scale test of a high-velocity grade-crossing simulated accident of a locomotive and a nuclear-spent-fuel shipping cask, 8:24111 (R:US)
Seals
Grayloc seal static tests, 8:24112 (R:US)
SPENT FUEL ELEMENTS
Reprocessing
Effect of high solvent radiation exposures on TBP processing of spent LMFBR fuels, 8:23519 (R:US)
Tentative evaluation of consequences of extended burnup on reprocessing of LWR spent fuel, 8:23463 (RA:US)
SPENT FUEL STORAGE
Cost
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
Criticality
Nuclear criticality safety experiments, calculations, and analyses: 1958 to 1982. Volume 1. Lookup tables, 8:23544 (R:US)
Nuclear criticality safety experiments, calculations, and analyses - 1958 to 1982. Volume 2. Summaries. Compilation of papers from the Transactions of the American Nuclear Society, 8:23545 (R:US)
Economics
Economics of spent LWR fuel storage (Comparison of reracking, new at-reactor storage facilities, and away-from-reactor storage facilities), 8:23116 (R:US)
Forecasting
Spent-fuel-storage requirements: an update of DOE/RL-82-1 (To year 2000 AD), 8:23114 (R:US)
Fuel Racks
Rack test and facility enhancement program, 8:23115 (R:US)
Storage Facilities
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
Rack test and facility enhancement program, 8:23115 (R:US)
SPENT FUELS
Inspection
Role of mockup testing in the Hot Fuel Examination Facility remote operations, 8:24103 (R:US)
Isotope Ratio
Isotope correlations for safeguards surveillance and accountancy methods, 8:23190 (R:US)
Laser Isotope Separation
Laser isotope separation in nuclear-waste by-product utilization, 8:23176 (R:US)
Leaching
Eh and fission product solubilities: two factors in the leaching of UO_2, 8:23109 (J:US)
Purex Process
CONSEPT; controller-run solvent extraction (IBM3033,360,370; FORTRAN IV (98%) and BAL (2%)), 8:23110 (R:US)
PUBG; purex solvent extraction process model (IBM3033;CDC CYBER175; FORTRAN IV), 8:23111 (R:US)
Reprocessing
International fuel-cycle and waste-management technology-exchange activities sponsored by the United States Department of Energy: FY 1982 evaluation report, 8:23163 (R:US)
Nuclear criticality safety experiments, calculations, and analyses: 1958 to 1982. Volume 1. Lookup tables, 8:23544 (R:US)
Nuclear criticality safety experiments, calculations, and analyses - 1958 to 1982. Volume 2. Summaries. Compilation of papers from the Transactions of the American Nuclear Society, 8:23545 (R:US)
US Department of Energy comments on the paper entitled "Bubble, bubble, toil and trouble: reprocessing nuclear spent fuel", 8:23112 (R:US)
Test Facilities
Role of mockup testing in the Hot Fuel Examination Facility remote operations, 8:24103 (R:US)
Thorex Process
CONSEPT; controller-run solvent extraction (IBM3033,360,370; FORTRAN IV (98%) and BAL (2%)), 8:23110 (R:US)

SPERMATOCYTES
Meiosis
Meiotic studies of rearrangements by synaptonemal complex analysis, 8:24337 (RA:US)
SPERMATOGONIA
Gene Mutations
Nature of specific-locus mutations induced by ethylnitrosourea in mouse spermatogonia, 8:24424 (RA:US)
Genetic Radiation Effects
Radiation induction of heritable translocations in mice (X radiation), 8:24384 (RA:US)
Specific-locus mutation frequencies in mouse stem-cell spermatogonia at very low radiation dose rates, and their use in the estimation of genetic hazards of radiation in man (Gamma radiation), 8:24382 (RA:US)
SPHEROMAK DEVICES
Computerized Control Systems
Control and data acquisition systems for the S-1 spheromak, 8:25182 (J:US)
Data Acquisition Systems
Control and data acquisition systems for the S-1 spheromak, 8:25182 (J:US)
Design
Sheromak approach to high power density reactors, 8:24940 (J:US)
Magnet Coils
Engineering design and construction of the S-1 spheromak coil systems, 8:25034 (J:US)
SPINACH
Nutrition
Increasing total and biologically active chromium in wheat grain and spinach by spraying with chromium salts, 8:24467 (J:US)
SPIN-LATTICE RELAXATION
Differential PAC
Local 4f moment studies by TDPAD, 8:24740 (RA:DE:In German, English)
SPIN-OFF
See TECHNOLOGY TRANSFER
SPOIL BANKS
Revegetation
Soil-depth requirements to reclaim surface-mined areas in the northern Great Plains. Open file report 29 Jul 76-8 Apr 82, 8:22965 (R:US)
SPRINGS
Mechanical springs only.
Dynamic Loads
SHOCK; dynamic response of lumped-mass systems (CDC6600,7600; FORTRAN IV), 8:24087 (R:US)
SPUTTERING
Computer Codes
Physical sputtering code for fusion applications, 8:25172 (J:US)
SRC PROCESS
Pilot Plants
Overview of coal liquefaction in the US Department of Energy, 8:22917 (R:US)
STAINLESS STEEL-304
Stress Corrosion
Stress corrosion of type 304 steel in H_2SO_4 alkali halide environments, 8:23912 (RA:US)
STAINLESS STEEL-310
Corrosion
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
Failures
Failure observations of pressurized tubes of candidate alloys in 980°C coal-gasification atmospheres, 8:22930 (R:US)
STAINLESS STEEL-316
Crack Propagation
Environmental effects on elevated temperature fatigue crack propagation in Type 316 stainless steel for fusion reactor applications, 8:23922 (RA:US)
Embrittlement
Helium embrittlement of stainless steels at ambient temperature, 8:24911 (J:US)
Physical Radiation Effects
Microstructural and microchemical comparisons of AISI 316 irradiated in HFIR and EBR-II, 8:23955 (R:US)
STAINLESS STEELS
See also STAINLESS STEEL-304
STAINLESS STEEL-310
STAINLESS STEEL-316
Corrosion
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
Plant Materials Program: progress June 1981-May 1982, 8:23465 (R:US)
Creep
Micromechanical modeling of microstructural damage in creeping alloys. Progress report, March 1, 1982-February 28, 1983, 8:23950 (R:US)
Damage
Micromechanical modeling of microstructural damage in creeping alloys. Progress report, March 1, 1982-February 28, 1983, 8:23950 (R:US)
Embrittlement
Helium embrittlement of stainless steels at ambient temperature, 8:24911 (J:US)
Erosion
Arc velocity and erosion for stainless steel and aluminium cathodes, 8:24886 (J:NL)
Microstructure
Micromechanical modeling of microstructural damage in creeping alloys. Progress report, March 1, 1982-February 28, 1983, 8:23950 (R:US)
Microstructural degradation in boiler steels (SA210A1, SA209T1, SA213-T11, SA213-T22, SA213-321, SA213-347), 8:23928 (RA:US)
Oxidation
Microstructural degradation in boiler steels (SA210A1, SA209T1, SA213-T11, SA213-T22, SA213-321, SA213-347), 8:23928 (RA:US)
Stress Corrosion
Analysis of a heat-transfer fluid fill pipe failure, 8:23914 (RA:US)
Surface Cleaning
Light impurity removal from stainless steel by atomic hydrogen, 8:24881 (J:NL)
STANDING CROP
See BIOMASS
STARFIRE TOKAMAK
Cost
Tokamak reactor cost model based on STARFIRE/WILDCAT costing, 8:24818 (R:US)
Current-Drive Heating
Driver options for steady-state tokamak reactors, 8:25079 (J:US)
Design
Nuclear analysis of a d-d tokamak reactor design, wildcat, 8:24912 (J:US)
Deuteron Reactions
Nuclear analysis of a d-d tokamak reactor design, wildcat, 8:24912 (J:US)
ECR Heating
Driver options for steady-state tokamak reactors, 8:25079 (J:US)
ICR Heating
FED and starfire icrh systems, 8:25099 (J:US)
Icrh system characteristics, 8:25100 (J:US)
STATE BUILDINGS
See PUBLIC BUILDINGS
STATISTICAL DATA
Use only in conjunction with literary indicator labels for data flagging.
Data Acquisition
Directory of Energy Data Collection Forms, 8:23691 (R:US)
Reporting Requirements
Directory of Energy Data Collection Forms, 8:23691 (R:US)
STATISTICAL MECHANICS
Nonlinear Problems
Breather annihilation by simple dissipation, 8:24755 (J:US)
STEADY FLOW
Computer Codes
EVITS; steady state two-dimensional fluid flow (IBM360,370; FORTRAN IV), 8:24568 (R:US)

STEAM GENERATORS
Cleaning
Cleaning steam generators off-line (soaking) with chelants. Final report (PWR), 8:23497 (R:US)
Design
Foster Wheeler protected bayonet-tube steam-generator conceptual designs, 8:23518 (R:US)
Evacuated Tube Collectors
Direct solar steam-generating system, 8:23316 (R:US)
Heat Transfer
Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior, 8:23601 (R:US)
Thermal and hydraulic code verification: ATHOS2 and model boiler No. 2 data. Volume 3. Final report, 8:23503 (R:US)
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report (PWR), 8:23502 (R:US)
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report (PWR), 8:23501 (R:US)
Thermal-hydraulic code qualification: ATHOS2 and data from Bugey 4 and Tricastin 1. Final report (PWR), 8:23499 (R:US)
Hydraulics
Flow-induced vibration of a curved tube array subject to liquid cross flow, 8:23469 (R:US)
Performance of large LWR system codes in calculating the steam-generator heat-transfer behavior, 8:23601 (R:US)
Thermal and hydraulic code verification: ATHOS2 and model boiler No. 2 data. Volume 3. Final report, 8:23503 (R:US)
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report (PWR), 8:23502 (R:US)
Thermal and hydraulic code verification: ATHOS2 and Model Boiler No. 2 data. Final report (PWR), 8:23501 (R:US)
Thermal-hydraulic code qualification: ATHOS2 and data from Bugey 4 and Tricastin 1. Final report (PWR), 8:23499 (R:US)
Mechanical Vibrations
Flow-induced vibration of a curved tube array subject to liquid cross flow, 8:23469 (R:US)
Modifications
Safety-Evaluation Report related to the D2/D3 steam-generator design modification (PWR), 8:23624 (R:US)
Pollution Control Equipment
Start-up and performance of a high-sulfur dry-scrubber system, 8:22946 (R:US)
Tubes
Intergranular attack in Inconel 600 nuclear steam generator tubes, 8:23923 (RA:US)
STEAM INJECTION
Equipment
Downhole steam injector, 8:23021 (P:US)
STEAM TURBINES
Failures
Scale modeling of turbine-missile impact into concrete. Final report (PWR), 8:23611 (R:US)
STEAMBOAT SPRINGS
Geochemical Surveys
Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22, 8:23368 (R:US)
Geophysical Surveys
Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22, 8:23368 (R:US)
Resource Assessment
Geothermal-resource assessment of the Steamboat-Routt Hot Springs area, Colorado. Resources Series 22, 8:23368 (R:US)
STEEL INDUSTRY
See METAL INDUSTRY
STEEL-ASTM-A533-B
Fracture Properties
Effect of neutron irradiation on dynamic fracture toughness of A533 Grade B Class 1 pressure vessel steel , 8:23919 (RA:US)
Physical Radiation Effects
Effect of neutron irradiation on dynamic fracture toughness of A533 Grade B Class 1 pressure vessel steel , 8:23919 (RA:US)
STEELS
See also AUSTENITIC STEELS
CARBON STEELS
NICKEL STEELS
STAINLESS STEELS
Corrosion
In-situ studies of reduction reactions of weathering steel surface films by Raman spectroscopy, 8:23900 (RA:US)
Corrosion Fatigue
Assessment of corrosion fatigue behavior of offshore structures, 8:23904 (RA:US)
Fatigue of welded structural steel in sea water, 8:23905 (RA:US)
Crack Propagation
Fatigue crack growth in aqueous and gaseous environments, 8:23903 (RA:US)
Investigation of fatigue crack growth in a 288°C PWR water environment by a constant ΔK test method, 8:23906 (RA:US)
Ductility
Tensile and fracture toughness behavior of AISI 4130 steel in the presence of eutectic Pb-Sn solder, 8:23917 (RA:US)
Embrittlement
Metallographic and fractographic aspects of liquid-metal embrittlement (Al-Zn-Mg (6.3% Zn 2.9% Mg); Ni 200 alloy (99.5% Ni); Inconel 601; D6AC steel), 8:23915 (RA:US)
Fatigue
Fatigue crack growth in aqueous and gaseous environments, 8:23903 (RA:US)
Investigation of fatigue crack growth in a 288°C PWR water environment by a constant ΔK test method, 8:23906 (RA:US)
Fracture Properties
Fracture toughness of PWR-components supports, 8:23505 (R:US)
Tensile and fracture toughness behavior of AISI 4130 steel in the presence of eutectic Pb-Sn solder, 8:23917 (RA:US)
Fractures
Metallographic and fractographic aspects of liquid-metal embrittlement (Al-Zn-Mg (6.3% Zn 2.9% Mg); Ni 200 alloy (99.5% Ni); Inconel 601; D6AC steel), 8:23915 (RA:US)
Freezing
Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J:US)
Fuel-Cladding Interactions
Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J:US)
High-Level Radioactive Wastes
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
Melting
Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J:US)
Microstructure
Microstructural degradation in boiler steels (SA210A1, SA209T1, SA213-T11, SA213-T22, SA213-321, SA213-347), 8:23928 (RA:US)
Oxidation
Influence of interfacial stresses on oxide scale adherence (Types 1018, 304, and 430), 8:23925 (RA:US)
Microstructural degradation in boiler steels (SA210A1, SA209T1, SA213-T11, SA213-T22, SA213-321, SA213-347), 8:23928 (RA:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Recycling
Steel-mill-residue recycling processes: an energy and economic analysis. Project final report, 8:23857 (R:US)
Stress Corrosion
Slow strain rate stress corrosion testing of boiler construction materials in synthetic flue gas at elevated temperatures (SA 213 T11 (1.25% Cr-.5% Mo); SA 213 T 22 (2.25% Cr - 1% Mo)), 8:23910 (RA:US)
Tensile Properties
Tensile and fracture toughness behavior of AISI 4130 steel in the presence of eutectic Pb-Sn solder, 8:23917 (RA:US)

Yield Strength
Buckling investigation of ring-stiffened cylindrical shells with reinforced openings under unsymmetrical axial loads, 8:23551 (R:US)

STELLARATOR TYPE REACTORS
Design
Conceptual design studies of the Modular Stellarator Reactor (MSR), 8:24932 (J:US)
UWTOR-M, a conceptual design study of a modular stellarator power reactor, 8:24939 (J:US)
Modular Structures
Conceptual design studies of the Modular Stellarator Reactor (MSR), 8:24932 (J:US)
UWTOR-M, a conceptual design study of a modular stellarator power reactor, 8:24939 (J:US)

STELLARATORS
See also JIPP STELLARATOR
WENDELSTEIN-7 STELLARATOR
Magnetic Field Configurations
Tokamak-stellarator hybrid configurations with unlinked helical coils, 8:24832 (R:JP)
Plasma Density
Calculation of hydrogen density in toroidal plasma, 8:24793 (J:NL)

STEM CELLS
Genetic Radiation Effects
Mammalian biochemical genetics (X radiation and mutagens), 8:24379 (RA:US)

STERILITY
Genetics
Investigation of the causes of genetic male sterility, 8:24336 (RA:US)

STIMULATED EMISSION DEVICES
See LASERS

STIRLING ENGINES
Design
Development of a quiet Stirling cycle multi-fuel engine for electric power generation. Final report Feb-Aug 82, 8:23397 (R:US)

STORAGE BATTERIES
See ELECTRIC BATTERIES

STORAGE BATTERIES (LEAD-ACID)
See LEAD-ACID BATTERIES

STORAGE FACILITIES
Capacity
Spent-fuel-storage requirements: an update of DOE/RL-82-1 (To year 2000 AD), 8:23114 (R:US)
Cost
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
Design
MRS/IS facility co-located with a repository: preconceptual design and life-cycle cost estimates, 8:23162 (R:US)
Site Selection
Geological and geotechnical studies for the construction of pilot caverns in rock for the storage of crude oil, hydrocarbon products and LPG, 8:23045 (R:DE:In German)

STORAGE RINGS
Beam Stacking
Stochastic stacking without filters, 8:24194 (R:US)

STORAGE (SPENT FUEL)
See SPENT FUEL STORAGE

STORAGE TUBES
See ELECTRON TUBES

STORES
See COMMERCIAL BUILDINGS

STOVER
See AGRICULTURAL WASTES

STRATEGIC PETROLEUM RESERVE
Cost Overruns
Excessive costs incurred by the Strategic Petroleum Reserve program for rental and other services, 8:23722 (R:US)
Program Management
Excessive costs incurred by the Strategic Petroleum Reserve program for rental and other aervices, 8:23722 (R:US)

STRAW
Decomposition
Straw processing, 8:23864 (R:DE:In German)
Gasification
Development of an energy converter for the production of heat, mechanical and electrical energy through the gasificaton of wood and straw in a batch gasifier with an output of 50-150 kw. extended to include the gasification of batched biomass with an output of 150-400 kw. Final report, 8:23226 (R:US)
Production
Production of cereal straw and corn stalks for energy purposes. Photosynthetic production of organic matter, 8:23271 (R:XE:FR)
Resource Potential
Production of cereal straw and corn stalks for energy purposes. Photosynthetic production of organic matter, 8:23271 (R:XE:FR)

STREAMS
Geochemical Surveys
Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23098 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R:US)
Water Quality
Stream water quality in the coal region of Pennsylvania. General technical report, 8:22962 (R:US)
Stream water quality in the coal region of Alabama and Georgia. General technical report (final), 8:22963 (R:US)

STREETS
See ROADS

STRESS ANALYSIS
Computer Codes
AXICRP; finite element code for creep analysis (CDC6600,7600,CYBER74; FORTRAN IV), 8:23513 (R:US)
CREEP-PLAST2; 2-dimensional inelastic structural analysis (IBM360,370; FORTRAN IV (95%) and BAL (5%)), 8:24090 (R:US)
SWAP9; stress-wave analysis in 1-dimensional strain (CDC6600,7600; FORTRAN IV), 8:24092 (R:US)
Computer Graphics
GRFPAK; plot package for CORTES FEM programs (IBM360,370; FORTRAN IV), 8:24086 (R:US)
Finite Element Method
Finite element analyses and instrumentation layout for the superconducting test facility TOSKA, 8:25013 (J:US)

STRIPPER FOILS
See BEAM STRIPPERS

STRIPPERS
See BEAM STRIPPERS

STRONG INTERACTIONS
Quantum Chromodynamics
Implications of QCD for soft hadronic and nuclear processes, 8:24612 (RA:US)

STRONTIUM
Separation Processes
Cesium and strontium fractionation from HLW for thermal-stress reduction in a geologic repository, 8:23166 (R:US)
Toxicity
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)

STRONTIUM 78
Beta-Plus Decay
Halflife and decay of ^{78}Sr, 8:24670 (RA:DE:In German)
Gamma Cascades
Gamma ray spectroscopy in ^{78}Sr and ^{83}Zr, 8:24669 (RA:DE:In German)

STRONTIUM 88 TARGET
Krypton 86 Reactions
Role of deformation and shell effects in deep inelastic collisions of ^{86}Kr + ^{88}Sr,^{90}Zr,^{92}Mo at energies close to the Coulomb barrier, 8:24667 (RA:DE:In German, English)

STRONTIUM 90
Inventories
Byproduct inventories, 8:23171 (R:US)
Radioisotope Heat Sources
Heat-source specification 500 watt(e) RTG, 8:23201 (R:US)
Recovery
Technology for recovery of byproducts, 8:23173 (R:US)
STRUCTURAL BUCKLING
See DEFORMATION
STRUCTURES (BUILDINGS)
See BUILDINGS
STRUCTURES (MECHANICS)
See MECHANICAL STRUCTURES
STYRENE POLYMERS
See POLYSTYRENE
SUBURBS
See URBAN AREAS
SULFATES
See also COBALT SULFATES
NICKEL SULFATES
SODIUM SULFATES
Deposition
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
Mass Balance
Lake acidification during spring snowmelt: processes and causes, 8:24285 (RA:US)
Washout
Wet and dry deposition into Adirondack watersheds, 8:24235 (RA:US)
SULFIDES
See also CADMIUM SULFIDES
EUROPIUM SULFIDES
HYDROGEN SULFIDES
LANTHANUM SULFIDES
MOLYBDENUM SULFIDES
POTASSIUM SULFIDES
Corrosive Effects
Sulfide attack in steam surface condensers, 8:23896 (RA:US)
SULFONIC ACID ESTERS
See also EMS
METHYL METHANESULFONATE
Phase Studies
Phase behaviour of alkylxylenesulphonate/oil/brine systems, 8:23023 (BA:FR)
SULFUR
Atmospheric Chemistry
SULCAL; model of sulfur chemistry in a plume (IBM360,370; FORTRAN IV), 8:24228 (R:US)
Retention
Exploratory and basic fluidized-bed combustion studies. Annual report, October 1980-September 1981, 8:24148 (R:US)
Review of low-rank-coal AFBC testing, 8:22996 (R:US)
SULFUR DIOXIDE
POLUTE; forest air pollutant uptake model (IBM360,370; CSMP), 8:24301 (R:US)
Biological Effects
Analysis of health effects resulting from population exposures to ambient particulate matter. Annual progress report, July 16, 1982-March 15, 1983, 8:24407 (R:US)
Approach to modelling vegetation yield reduction from point-source emissions of sulfur dioxide, 8:24400 (R:US)
Effect of NO_2 and SO_2 alone and in combination on the productivity of field-grown soybeans, 8:24406 (R:US)
Ecological Concentration
Air pollution by sulfur dioxide, 8:24240 (R:DE:In German)
Environmental Impacts
Approach to modelling vegetation yield reduction from point-source emissions of sulfur dioxide, 8:24400 (R:US)
Health Hazards
Analysis of health effects resulting from population exposures to ambient particulate matter. Annual progress report, July 16, 1982-March 15, 1983, 8:24407 (R:US)
Monitoring
Simplified approaches to protecting PSD Class I areas. Final report, 8:24302 (R:US)
Personnel Monitoring
State-of-the-art of commercially available personal monitors for NO/sub x/, SO_2 and particulate matter in ambient air, 8:24246 (J:US)
Removal
Control of sulfur dioxide, chlorine, and trace-element emissions from coal-fired boilers by fabric filtration, 8:22945 (R:US)
DOE's electron-beam-irradiation development program, 8:22954 (R:US)
Simultaneous removal of SO_2 and NO/sub x/ from flue gas employing a fluidized-bed copper oxide process, 8:22953 (R:US)
SULFUR FLUORIDES
Dielectric Properties
Boundary layer property of definite polluted epoxide resin insulators in sulfur hexafluoride by high alternating voltage, 8:23439 (R:DE:In German)
Electronic Structure
Photoelectron branching ratios and angular distributions for the valence levels of SF_6 in the range 16< or =hν< or =30 eV, 8:24555 (J:US)
Photoionization
Photoelectron branching ratios and angular distributions for the valence levels of SF_6 in the range 16< or =hν< or =30 eV, 8:24555 (J:US)
SULFUR HYDRIDES
See HYDROGEN SULFIDES
SULFUR IONS
Energy-Level Transitions
Beam-foil spectroscopy at Argonne National Laboratory, 8:24517 (R:US)
Ion Spectroscopy
Beam-foil spectroscopy at Argonne National Laboratory, 8:24517 (R:US)
SULFUR OXIDES
See also SULFUR DIOXIDE
Air Pollution Abatement
High pressure combustor at Leatherhead Test seven results: dolomite size effects, 8:24151 (R:US)
Chemical Reactions
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982 (Sulfur trioxide), 8:24003 (R:US)
Corrosive Effects
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982 (Sulfur trioxide), 8:24003 (R:US)
Removal
Advanced environmental control technology , 8:22952 (R:US)
Scavenging
Precipitation-scavenging chemistry for sulfate and nitrate from the SURE and related data. Volume 2. Final report, 8:24224 (R:US)
SULFUR SULFIDES
See SULFUR
SULFURIC ACID
Corrosive Effects
Stress corrosion of type 304 steel in H_2SO_4 alkali halide environments, 8:23912 (RA:US)
SUPER HIGH FREQUENCY RADIATION
See RADIOWAVE RADIATION
SUPERALLOYS
See HEAT RESISTING ALLOYS
SUPERCONDUCTING CABLES
Cooling
Transient cooling in internally cooled, cabled superconductors (ICCS), 8:24124 (J:US)
Energy Losses
Lorenz force induced strand motion in a superconducting cable, 8:25040 (J:US)
Heat Transfer
Transient cooling in internally cooled, cabled superconductors (ICCS), 8:24124 (J:US)
Lorentz Force
Lorenz force induced strand motion in a superconducting cable, 8:25040 (J:US)

SUPERCONDUCTING COILS
Cooling
Modeling the cooldown of force cooled coils, 8:24121 (J:US)
Design
Design of a superconducting 20 MJ induction coil, 8:25044 (J:US)
High-Voltage Pulse Generators
Control of energy transfer with an inductor-convertor bridge, 8:24102 (R:US)
Power Losses
Studies on stability and a.c. losses of filamentary conductors for fast ramp rate ohmic heating coils, 8:25041 (J:US)
Quenching
Measurement and theoretical calculation of quench velocities within large fully epoxy impregnated superconducting coils, 8:24123 (J:US)
Stability
Studies on stability and a.c. losses of filamentary conductors for fast ramp rate ohmic heating coils, 8:25041 (J:US)
Test Facilities
Argonne pulsed cable test facility for the development of superconducting ohmic heating coils, 8:25052 (J:US)
SUPERCONDUCTING COMPOSITES
Critical Current
Temperature dependence of critical current superconducting for in situ composites, 8:23974 (J:US)
Specific Heat
Specific heat of in situ superconducting composites, 8:23973 (J:US)
Stability
Stability of an aluminum-NbTi composite conductor at reduced temperatures, 8:24129 (J:US)
Technology Assessment
Workshop on superconducting for magnets: frontiers of technology, 8:24128 (J:US)
SUPERCONDUCTING MAGNETIC ENERGY STORAGE
Superconducting Composites
Stability of an aluminum-NbTi composite conductor at reduced temperatures, 8:24129 (J:US)
Superconductors
Stability of an aluminum-NbTi composite conductor at reduced temperatures, 8:24129 (J:US)
SUPERCONDUCTING MAGNETS
Latest status of the Japanese LCT coil and the domestic test facility, 8:25053 (J:US)
Progress renort on the tandem contribution to the IEA Large Coil Task, 8:25055 (J:US)
Results of the cooldown analysis of the Swiss LCT coil, 8:25054 (J:US)
Acoustic Emission Testing
Acoustic emission triangulation of mechanical disturbances in superconducting magnets, 8:25016 (J:US)
Construction
Status of the magnet systems and highlight of the main assembly problems, 8:25032 (J:US)
Cooling Systems
Enhanced cooling with helium channels in the TF coil casing for FED, 8:25025 (J:US)
Two-phase helium-IV quench analysis for superconducting magnets, 8:25010 (J:US)
Design
Design, construction, and test of a 113-mm bore solenoid with NbTi cable-in-conduit superconducting windings, 8:24126 (J:US)
Design and testing of a dual 8-T 380-mm/12-T 220-mm split superconducting solenoid for ORNL, 8:24125 (J:US)
Design characteristics of the TFTR sector module (I), 8:25022 (J:US)
Design of epoxy-free superconducting dipole magnets and performance in both helium I and pressurized helium II, 8:24117 (J:US)
Development of TFTR sector module assembly procedures (II), 8:25023 (J:US)
Development of superconducting poloidal field coils for tokamak reactors, 8:25043 (J:US)
EBTR magnet design, 8:25012 (J:US)
Engineering feasibility challenges for the magnet community, 8:25033 (J:US)
Engineering, testing and manufacturing the general dynamics test coil for the Large Coil Program - an update, 8:25045 (J:US)
Enhanced cooling with helium channels in the TF coil casing for FED, 8:25025 (J:US)
Large-current conductor development for superconducting poloidal coils, 8:25057 (J:US)
Magnet design for INTOR, 8:25039 (J:US)
Magnet system for a thermal barrier Tandem Mirror Reactor, 8:24989 (J:US)
Model of toroidal magnet systems as orthotropic shells of finite thickness, 8:24991 (J:US)
Quench protection and design of large high current density superconducting magnets, 8:24122 (J:US)
Structural design procedures for FED magnets, 8:25035 (J:US)
Superconducting ohmic heating solenoid concept for ISX-C, 8:25014 (J:US)
Superconducting poloidal field coil studies for INTOR, 8:25046 (J:US)
TMX-axisymmetric magnet set design study, 8:24985 (J:US)
Disturbances
Acoustic emission triangulation of mechanical disturbances in superconducting magnets, 8:25016 (J:US)
Electric Arcs
Missile generation due to electrical arcing in high field fusion magnets, 8:25006 (J:US)
Electrical Faults
Safety consequences of shorted turns in a cryostable superconducting magnet, 8:23780 (J:US)
Safety implications of shorted turns in superconducting magnets for fusion, 8:25015 (J:US)
Electrical Testing
Engineering, testing and manufacturing the general dynamics test coil for the Large Coil Program - an update, 8:25045 (J:US)
Fabrication
Design, construction, and test of a 113-mm bore solenoid with NbTi cable-in-conduit superconducting windings, 8:24126 (J:US)
Fabrication experiences of the Coal-Fired Flow Facility superconducting dipole magnet, 8:23777 (J:US)
General Dynamics superconducting magnet for the Large Coil Program: a progress report, 8:24119 (J:US)
Hazards
Missile generation due to electrical arcing in high field fusion magnets, 8:25006 (J:US)
Heat Transfer
Pool boiling helium heat transfer from two large monolithic copper stabilizers, 8:25011 (J:US)
Joule Heating
Safety consequences of shorted turns in a cryostable superconducting magnet, 8:23780 (J:US)
Magnetic Shielding
Evaluation of the use of a normal shield to reduce transient field induced losses in tokamak superconducting coils, 8:24988 (J:US)
Manufacturing
Manufacture of 16,000 amp superconducting conductor for the tokamak toroidal field coil program, 8:25019 (J:US)
Materials
Thermal expansion of several materials for superconducting magnets, 8:24127 (J:US)
Materials Testing
Coil performance test of nb/sub 3/sn conductor to be used in the advanced cluster test facility, 8:25018 (J:US)
Development of ferritic weldments for grain-refined ferritic steels for 4.2K service, 8:23971 (R:US)
Mechanical Structures
Measurements of mechanical properties of superstructures materials for the CFFF superconducting MHD magnet, 8:23778 (J:US)
Structural behavior of the Bitter plate tf magnet for the Zephyr ignition test reactor, 8:25005 (J:US)

Organic Insulators
Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (II), 8:24021 (TJ:US)
Effect of low-temperature reactor irradiation on organic insulators in superconducting magnets (III), 8:24020 (TJ:US)
Performance Testing
Coil performance test of nb/sub 3/sn conductor to be used in the advanced cluster test facility, 8:25018 (J:US)
Design of epoxy-free superconducting dipole magnets and performance in both helium I and pressurized helium II, 8:24117 (J:US)
Pool Boiling
Pool boiling helium heat transfer from two large monolithic copper stabilizers, 8:25011 (J:US)
Pool boiling superconducting coils for the Large Coil Task, 8:25036 (J:US)
Power Losses
Evaluation of the use of a normal shield to reduce transient field induced losses in tokamak superconducting coils, 8:24988 (J:US)
Power Supplies
10 kA pulsed power supply for superconducting coils, 8:25070 (J:US)
10-kA pulsed power supply for superconducting coils, 8:24821 (R:US)
Application of power factor correction in the Tandem Mirror Experiment upgrade magnet power supply, 8:25069 (J:US)
Commissioning tests for the TEXTOR toroidal field power supply system, 8:25063 (J:US)
TEXT poloidal field power systems operation, 8:25026 (J:US)
TEXT toroidal field power supply operation, 8:25027 (J:US)
Quenching
Quench protection and design of large high current density superconducting magnets, 8:24122 (J:US)
Research Programs
United States Superconducting MHD Magnet Technology Development Program, 8:23779 (J:US)
Shape
Iterative numerical procedure for determining the shape of a constant tension 'D' magnet, 8:24986 (J:US)
Strains
Comparison between experimental and analytical winding prestrain for a circular solenoid, 8:25017 (J:US)
Stress Analysis
Iterative numerical procedure for determining the shape of a constant tension 'D' magnet, 8:24986 (J:US)
Model of toroidal magnet systems as orthotropic shells of finite thickness, 8:24991 (J:US)
Structural behavior of the Bitter plate tf magnet for the Zephyr ignition test reactor, 8:25005 (J:US)
Stresses
Comparison between experimental and analytical winding prestrain for a circular solenoid, 8:25017 (J:US)
Superconducting Composites
Workshop on superconducting for magnets: frontiers of technology, 8:24128 (J:US)
Test Facilities
Advances in the cluster test facility and the test module coil development, 8:25056 (J:US)
Finite element analyses and instrumentation layout for the superconducting test facility TOSKA, 8:25013 (J:US)
Testing
Design, construction, and test of a 113-mm bore solenoid with NbTi cable-in-conduit superconducting windings, 8:24126 (J:US)
Design and testing of a dual 8-T 380-mm/12-T 220-mm split superconducting solenoid for ORNL, 8:24125 (J:US)
Tests of the first development coils for EBT-P, 8:25051 (J:US)
Thermal Shields
Thermal design considerations of shields for levitated coils, 8:25024 (J:US)

SUPERCONDUCTORS
Cooling
Persistent resistive regions and cryogenic stability of composite conductors: effect of cooling spacers, 8:25042 (J:US)
Cryogenics
Persistent resistive regions and cryogenic stability of composite conductors: effect of cooling spacers, 8:25042 (J:US)
Current Density
Current densities of commercial NbTi-based alloys for high field applications, 8:24118 (J:US)
Electrical Testing
Origin of resistive voltage and the related problems in large-capacity Nb_3Sn conductor, 8:25020 (J:US)
Electronic Structure
SCF-X alpha-SW cluster molecular-orbital models of catalysts, alloys, magnetic materials, and superconductors. Interim report, 8:23891 (R:US)
Impurities
Magnetic impurities in superconductors. Progress report, August 1, 1982-June 30, 1983, 8:24745 (R:US)
Manufacturing
Production experience: the Nb/sub 3/Sn forced flow conductor for the Large Coil Program, 8:25049 (J:US)
Safety
Safety studies of cryostable superconductor, 8:24120 (J:US)
Soldering
Soldering studies of an aluminum stabilized superconductor, 8:25048 (J:US)
Stability
Safety studies of cryostable superconductor, 8:24120 (J:US)
Stability of an aluminum-NbTi composite conductor at reduced temperatures, 8:24129 (J:US)

SUPERCRITICAL FLOW
See TURBULENT FLOW

SUPERHILAC
Accelerator Facilities
On-line laser spectroscopy with a cooled He-jet transport system, 8:24174 (R:US)

SUPERNOVAE
Gamma Radiation
Gamma-line astronomy, 8:24507 (J:GB)
Nucleosynthesis
Gamma-line astronomy, 8:24507 (J:GB)

SUPERVOLTAGE RADIOTHERAPY
See RADIOTHERAPY

SUPPORTS
See also FOUNDATIONS
FUEL RACKS
POWERED SUPPORTS
Fracture Properties
Fracture toughness of PWR-components supports, 8:23505 (R:US)
Stress Analysis
SUPAN; analysis of beam-type piping supports (CDC7600; FORTRAN IV), 8:23400 (R:US)

SURFACE AIR
Radiation Monitoring
Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R:US)

SURFACE CONTAMINATION
Mathematical Models
Estimation of airborne and surface contamination resulting from the deposition-resuspension process, 8:24251 (J:GB)

SURFACE MINING
Environmental Effects
Mortality as influenced by alteration of Pennsylvanian shale by strip mining of coal, 8:24458 (J:US)
Environmental Impacts
Stream water quality in the coal region of Pennsylvania. General technical report, 8:22962 (R:US)
Stream water quality in the coal region of Alabama and Georgia. General technical report (final), 8:22963 (R:US)
Land Reclamation
Soil-depth requirements to reclaim surface-mined areas in the northern Great Plains. Open file report 29 Jul 76-8 Apr 82, 8:22965 (R:US)
Surface mine reclamation for wildlife: a model reclamation plan for southern Appalachia. Final report, 8:22964 (R:US)
Mining Equipment
Built-In Test Equipment (BITE) to improve front-end-loader productivity. Final technical report, 8:22973 (R:US)

SURFACE WATERS
See also COASTAL WATERS
LAKES
PONDS
STREAMS
Chemical Analysis
Hydrologic resource research, 8:23091 (RA:US)
Geochemical Surveys
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R:US)
Hydrology
CHNSED; sediment & containment transport model (IBM360,370; FORTRAN IV (96%) and BAL (4%)), 8:24275 (R:US)
WHTM; Wisconsin hydrologic transport model (IBM360,370; FORTRAN IV (96%) and Assembler (4%)), 8:24277 (R:US)
SURFACE-ACTIVE AGENTS
See SURFACTANTS
SURFACTANTS
Adsorption
Effect of the rate of adsorption at oil-water interface upon the displacement of residual oil, 8:23019 (R:US)
Corrosive Effects
Comprehensive investigation of chemical environmental for stress corrosion cracking of α-brass: characteristics and practical meanings of non-ammoniacal activities, 8:23913 (RA:US)
Surface Tension
Effect of the rate of adsorption at oil-water interface upon the displacement of residual oil, 8:23019 (R:US)
SURVEILLANCE (RADIOACTIVITY)
See RADIATION MONITORING
SURVEY (RADIOACTIVITY)
See RADIATION MONITORING
SUSPENSIONS (FUEL)
See FUEL SLURRIES
SWEAT GLANDS
See SKIN
SWITCHES
Design
Design and development of an electronic crowbar for the protection of HVDC neutral beam components, 8:25092 (J:US)
Performance Testing
Repetitive switching for inductive energy storage. Final technical report Apr 81-Jun 82, 8:23661 (R:US)
Trigger Circuits
Reliable trigger unit for rail gap swtiches, 8:25076 (J:US)
SYMPOSIA
See MEETINGS
SYNCHROTRON RADIATION
Electron Spectrometers
Photoelectron spectrometer for high-resolution angular resolved studies, 8:24209 (R:US)
SYNCRUDE
See SYNTHETIC PETROLEUM
SYNROC
See SYNTHETIC ROCKS
SYNTHESIS GAS
Purification
Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume II. Preliminary plant design and cost estimate (Proposed methanol project near Dunn Center, North Dakota), 8:23228 (R:US)
SYNTHETIC CRUDE OIL
See SYNTHETIC PETROLEUM
SYNTHETIC FUELS
See also SYNTHETIC PETROLEUM
1981 Winter Meeting - American Society of Agricultural Engineers, 8:23868 (J:US)
Environmental Impacts
Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study, 8:23727 (R:US)
Health Hazards
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Production
Present state of technology of recovery and conversion process for synthetic fuels - volume II, 8:23223 (R:US)
Present state of technology of recovery and conversion process for synthetic fuels - Volume 1, 8:23224 (R:US)
SYNTHETIC FUELS INDUSTRY
Environmental Impacts
Present state of technology of recovery and conversion process for synthetic fuels - volume II, 8:23223 (R:US)
Present state of technology of recovery and conversion process for synthetic fuels - Volume 1, 8:23224 (R:US)
Technology Assessment
Present state of technology of recovery and conversion process for synthetic fuels - volume II, 8:23223 (R:US)
Present state of technology of recovery and conversion process for synthetic fuels - Volume 1, 8:23224 (R:US)
SYNTHETIC PETROLEUM
Chemical Composition
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Chemical Properties
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Comparative Evaluations
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Physical Properties
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
Production
Impact of excessive aromatics in oil-sand syncrudes on production and quality of middle-distillate fuels, 8:23084 (B:CA)
SYNTHETIC ROCKS
Optimization
Thermal analysis, thermogravimetry and crystal chemical characterization of phases, 8:23136 (RA:DE)
SYNTHINE PROCESS
See FISCHER-TROPSCH SYNTHESIS
SYNTHOIL PROCESS
Catalysts
Coal liquefaction in SYNTHOIL reactor without added catalyst (Catalysts vs no catalyst), 8:22916 (R:US)
Pilot Plants
Coal liquefaction in SYNTHOIL reactor without added catalyst (Catalysts vs no catalyst), 8:22916 (R:US)
SYSTEM FAILURE ANALYSIS
See also FAULT TREE ANALYSIS
Computer Codes
SYSREL; reliability analysis of series systems (Honeywell Series 60 Level 66,6000; BASIC), 8:25257 (R:US)

T

TADPOLES
See AMPHIBIANS
TANDEM ELECTROSTATIC ACCELERATORS
Prior to February 1979,information was indexed to Van de Graaff Accelerators.
Beam Injection
Tandem-injector for VICKSI, 8:24181 (RA:DE:In German)
Beam Strippers
Terminal lens for an FN tandem, 8:24159 (R:US)
TANDEM MIRROR DEVICES
See TMR REACTORS
TMX DEVICES

TANDEM MIRROR TYPE REACTORS
See TMR REACTORS
TANK FARMS
See STORAGE FACILITIES
TANKS
Sensible Heat Storage
Storing solar energy in thermally stratified tanks, 8:23356 (R:US)
Stratification
Storing solar energy in thermally stratified tanks, 8:23356 (R:US)
Temperature Distribution
Storing solar energy in thermally stratified tanks, 8:23356 (R:US)
TANTALUM 181 TARGET
Fission
Fission fragment angular correlation in 300 MeV ^{20}Ne induced reactions on heavy targets, 8:24686 (RA:DE:In German, English)
TANTALUM ALLOYS
See also INCONEL 625
Electronic Structure
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R:US)
Superconductivity
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R:US)
TARGET CHAMBERS
Sample Preparation
Target laboratory, 8:24177 (RA:DE:In German)
TARGETS
See also ALUMINIUM 27 TARGET
BISMUTH 209 TARGET
CALCIUM 40 TARGET
CALCIUM 48 TARGET
CARBON 12 TARGET
ELECTRON BEAM TARGETS
ERBIUM 166 TARGET
ERBIUM 168 TARGET
ERBIUM 170 TARGET
GOLD 197 TARGET
HOLMIUM 165 TARGET
IRON 56 TARGET
LEAD 208 TARGET
MAGNESIUM 24 TARGET
MOLYBDENUM 100 TARGET
MOLYBDENUM 92 TARGET
NEODYMIUM 146 TARGET
NICKEL 58 TARGET
NICKEL 60 TARGET
PALLADIUM 110 TARGET
POLARIZED TARGETS
SAMARIUM 152 TARGET
SAMARIUM 154 TARGET
SILVER 109 TARGET
STRONTIUM 88 TARGET
TANTALUM 181 TARGET
TIN 112 TARGET
TIN 120 TARGET
TIN 124 TARGET
TITANIUM 50 TARGET
URANIUM 238 TARGET
ZIRCONIUM 90 TARGET
Design
Evaluation of structural integrity of IPNS-I and ZING-P' targets, 8:24171 (R:US)
High target gain to ICF reactor - a problem of repetition, 8:25137 (J:US)
Preliminary conceptual design and engineering aspects of a light ion fusion target development facility (TDF), 8:25136 (J:US)
Remote Handling Equipment
Remote target removal for the Oak Ridge 86-in. cyclotron, 8:24191 (J:US)
Sample Preparation
Sources of separated isotopes for nuclear targetry, 8:23200 (BA:US)
Stress Analysis
Evaluation of structural integrity of IPNS-I and ZING-P' targets, 8:24171 (R:US)
TARTRATES
Isotachophoresis
Isotachophoresis, 8:24050 (R:US)
TATB
Particle Size
TATB interlaboratory sieving study, 8:24213 (R:US)
TEARING INSTABILITY
Three-Dimensional Calculations
Effects of toroidicity on resistive tearing modes, 8:24768 (R:US)
TECHNETIUM
Inventories
Byproduct inventories, 8:23171 (R:US)
Recovery
Technology for recovery of byproducts, 8:23173 (R:US)
TECHNETIUM 99
Biological Radiation Effects
Radiation-dosimetry and chemical-toxicity considerations for ^{99}Tc, 8:24404 (R:US)
Toxicity
Radiation-dosimetry and chemical-toxicity considerations for ^{99}Tc, 8:24404 (R:US)
TECHNOLOGY TRANSFER
Information Dissemination
Information for technology innovation. Summary paper, 8:25284 (R:US)
Legal Aspects
Dissemination of technical information from the oil-shale program, 8:23079 (R:US)
TELLURIUM 122
Giant Resonance
Observation of giant dipole resonances built on states of high energy, 8:24678 (RA:DE:In German)
TEM
See ALKYLATING AGENTS
TEM (MICROSCOPY)
See TRANSMISSION ELECTRON MICROSCOPY
TEMPERATURE (AMBIENT)
See AMBIENT TEMPERATURE
TENNESSEE VALLEY AUTHORITY
Energy Conservation
Energy management annual report. Fiscal year 1982, 8:23710 (R:US)
Energy Policy
Energy management annual report. Fiscal year 1982, 8:23710 (R:US)
TENNESSEE VALLEY REGION
Power Demand
1981 commercial and industrial survey: customers of municipal and cooperative distributors of TVA power, 8:23752 (R:US)
TERATOGEN SCREENING
Frog Embryo Teratogenesis Assay: Xenopus (FETAX) - a newly developed screening assay for the detection of teratogens, 8:24419 (RA:US)
Teratogenic mechanisms and prescreening system, 8:24441 (RA:US)
TERATOGENESIS
Biological Pathways
Teratogenic mechanisms and prescreening system, 8:24441 (RA:US)
Risk Assessment
Utilization of critical periods during development to study the effects of low levels of environmental agents, 8:24385 (RA:US)
TERBIUM 147
Beta-Plus Decay
Atomic masses of rare-earth isotopes, 8:24679 (RA:DE:In German)
TERNARY ALLOY SYSTEMS
Moessbauer Effect
Moessbauer spectrometry study of Fe-Ni-X alloys, 8:23970 (R:US)
TERTIARY RECOVERY
See ENHANCED RECOVERY
TEST FACILITIES
Computerized Control Systems
Computer control of electrochemical experiments with application to zinc/nickel oxide cells, 8:23679 (R:US)

Data Acquisition Systems
Computer control of electrochemical experiments with application to zinc/nickel oxide cells, 8:23679 (R:US)
Refrigeration
Cyrogenics for TFTR neutral beam test cell, 8:25117 (J:US)
Shielding
Design of the precast, post-tensioned concrete shielding structure for the TFTR neutral beam test cell, 8:25116 (J:US)
Specifications
Experiments and procedures for bottom-heating heat-transfer experiments through UO_2 debris beds in sodium (LMFBR), 8:23596 (R:US)

TETRAMETHYLTETRASELENAFULVALENE
See TMTSF

TEXAS
Government Policies
State-local relations and urban technology: a study in intergovernmental decision making - executive summary, 8:24304 (R:US)
State-local relations and urban technology: a study in intergovernmental decision making, 8:24305 (R:US)
Natural Gas Fields
Gas deliverability and flow capacity of surveillance gas fields in Texas, 8:23063 (R:US)

TEXAS EXPERIMENTAL TOKAMAK
See TEXT DEVICES

TEXT DEVICES
Computerized Control Systems
Software requirements of the central control system computer for the TEXT tokamak, 8:25186 (J:US)
Operation
Start-up and operation of the Texas Experimental Tokamak, 8:24944 (J:US)
Power Supplies
Installation and operation of the motor-generator for the TEXT, 8:25028 (J:US)
TEXT poloidal field power systems operation, 8:25026 (J:US)
TEXT toroidal field power supply operation, 8:25027 (J:US)
Start-Up
Start-up and operation of the Texas Experimental Tokamak, 8:24944 (J:US)

TEXTILE INDUSTRY
Distributed Collector Power Plants
Solar Total-Energy Project, Shenandoah, Georgia site. Annual technical progress report, July 1, 1980-June 30, 1982, 8:23301 (R:US)
Energy Consumption
Development of retrofitting modifications of textile-loom picking and lay mechanisms for reduction of energy consumption. Final report, 8:23859 (R:US)
Equipment
Development of retrofitting modifications of textile-loom picking and lay mechanisms for reduction of energy consumption. Final report, 8:23859 (R:US)
Total Energy Systems
Solar Total-Energy Project, Shenandoah, Georgia site. Annual technical progress report, July 1, 1980-June 30, 1982, 8:23301 (R:US)

TEXTOR TOKAMAK
Beam Neutralization
Conductance thermal accommodation and beaming from neutralizer gas-cells, 8:25087 (J:US)
Control Systems
Experience from the implementation of a control-and data acquisition system for the tokamak TEXTOR, 8:25176 (J:US)
Data Acquisition
Experience from the implementation of a control-and data acquisition system for the tokamak TEXTOR, 8:25176 (J:US)
Electrical Testing
Magnetizing circuit of TEXTOR, 8:25029 (J:US)
ICR Heating
Icrf antenna design for a 3 MW, 3 s heating system on the TEXTOR tokamak, 8:25093 (J:US)
Magnetic Islands
Transport code calculations on the particle and energy unloading through overlapping magnetic islands, 8:24873 (J:NL)
Neutral Beam Sources
Conductance thermal accommodation and beaming from neutralizer gas-cells, 8:25087 (J:US)
Power Supplies
Commissioning tests for the TEXTOR toroidal field power supply system, 8:25063 (J:US)
Poloidal-field thyristor amplifier with improved power factor, for TEXTOR, 8:25062 (J:US)

TFR TOKAMAK
Data Acquisition Systems
Data acquisition system of TFR tokamak experiment, 8:25192 (J:US)
Divertors
RF divertor principle study in the TFR plasmas, 8:24861 (J:NL)

TFTR REACTORS
TFTR neutral beam test facility, 8:25067 (J:US)
Breeding Blankets
Design of a lithium blanket module for testing in the TFTR, 8:24980 (J:US)
Neutronic design for the TFTR lithium blanket module, 8:24975 (J:US)
Calorimeters
TFTR neutral beam calorimeter fabrication and instrumentation, 8:25215 (J:US)
Computerized Control Systems
Digitally controlled twelve-pulse firing generator, 8:25187 (J:US)
Control Systems
TFTR diagnostic vacuum controller, 8:25184 (J:US)
DC Amplifiers
Low noise, high impedance, dc coupled auto zeroing amplifier for TFTR, 8:25189 (J:US)
Design
Design characteristics of the TFTR sector module (I), 8:25022 (J:US)
Development of TFTR sector module assembly procedures (II), 8:25023 (J:US)
Engineering design of TFTR and it's impact on future tokamaks, 8:24942 (J:US)
Electric Grounds
TFTR grounding system, 8:25077 (J:US)
Electrical Insulation
Electrical insulation qualification tests for TFTR TF and PF coils, 8:25007 (J:US)
Electrical Insulators
Results of an insulator materials test program for application inside the TFTR plasma chamber, 8:25158 (J:US)
Energy Conversion
Design and cost of the TFTR power conversion system, 8:25133 (J:US)
Gas Injection
Design and development of the torus gas injection control system for TFTR, 8:25103 (J:US)
Limiters
Design and analysis of the TFTR fixed limiters - 1, 8:25201 (J:US)
Design and analysis of the TFTR fixed limiters - 2, 8:25202 (J:US)
Pumping and erosion rates for the TFTR and INTOR/FED limiter designs, 8:24856 (J:NL)
Magnet Coils
Description of the molding system for the epoxy impregnation of the TFTR poloidal field coils, 8:25021 (J:US)
Epoxy impregnation system for TFTR large coil program, 8:24919 (J:US)
Mechanical Structures
TFTR structural instrumentation, 8:25190 (J:US)
Neutral Atom Beam Injection
Analysis of optimal control theory applied to plasma position and current control during neutral beam heating in TFTR, 8:25101 (J:US)

Neutral Beam Sources
Cable information retrieval program, 8:25106 (J:US)
Cyrogenics for TFTR neutral beam test cell, 8:25117 (J:US)
Design of the precast, post-tensioned concrete shielding structure for the TFTR neutral beam test cell, 8:25116 (J:US)
Development of a high voltage crowbar, 8:25066 (J:US)
Gas density distribution results for NBSTF, 8:25086 (J:US)
Optimal Control
Analysis of optimal control theory applied to plasma position and current control during neutral beam heating in TFTR, 8:25101 (J:US)
Power Supplies
Plasma striking voltage production, 8:25075 (J:US)
Pressure Vessels
Fatigue testing of TFTR vacuum vessel bellows, 8:25160 (J:US)
Program Management
Tokamak Fusion Test Reactor Project, 8:24828 (R:US)
Timing Circuits
CAMAC timing and sequencing module, 8:25196 (J:US)
Vacuum Systems
Engineering and design aspects of the TFTR vacuum vessel bakeout and cooling system, 8:25214 (J:US)
Fabrication of the TFTR vacuum vessel, 8:25199 (J:US)
Valves
Fast shutter valve for TFTR neutral beam lines, 8:25128 (J:US)
Windows
Bakeable optical windows for the tokamak fusion test reactor, 8:25206 (J:US)

THALLIUM
Crystal Field
Temperature dependence of the EFG of ^{192}Tl in thallium metal, 8:23957 (RA:DE:In German)

THALLIUM 192
Nuclear Quadrupole Resonance
Temperature dependence of the EFG of ^{192}Tl in thallium metal, 8:23957 (RA:DE:In German)

THERMAL BARRIERS
Superconducting Magnets
Magnet system for a thermal barrier Tandem Mirror Reactor, 8:24989 (J:US)

THERMAL BATTERIES
Design
Characteristics and development report for the MC3573 thermal battery, 8:23682 (R:US)
Performance
Characteristics and development report for the MC3573 thermal battery, 8:23682 (R:US)

THERMAL CONDUCTIVITY
Measuring Methods
Fuel - cladding gap conductance measurements using Kalman filter methods, 8:23546 (J:US)

THERMAL DECOMPOSITION
See PYROLYSIS

THERMAL ENERGY STORAGE EQUIPMENT
Computerized Simulation
SOLTES1; thermal energy systems simulation (CDC6600,7600; FORTRAN IV (99%) and COMPASS (1%)), 8:23663 (R:US)
Design
Development of a thermal storage system based on the heat of absorption in hygroscopic materials. Final report, 8:23359 (R:US)
Solar Pilot Plant Phase I, detailed design report: thermal storage subsystem research experiment. CDRL Item No. 8 (Approved), 8:23303 (R:US)
Payback Period
Assessment of cool storage in commercial building applications, 8:23664 (R:US)
Performance
Assessment of cool storage in commercial building applications, 8:23664 (R:US)
Performance Testing
Analytical and experimental investigations of sodium heat pipes and thermal energy storage systems. Final report oct 80-sep 81, 8:24083 (R:US)
Solar Pilot Plant Phase I, detailed design report: thermal storage subsystem research experiment. CDRL Item No. 8 (Approved), 8:23303 (R:US)

THERMAL INSULATION
Energy Analysis
Energy analysis of solar energy systems, heat pumps and of improved insulation of single-family houses, 8:23796 (R:DE:In German)
Mathematical Models
Heat transfer in building thermal insulation: the thickness effect, 8:23834 (J:US)

THERMAL POLLUTION (AIR)
See AIR POLLUTION

THERMAL POLLUTION (WATER)
See WATER POLLUTION

THERMAL POWER PLANTS
See also COMBINED-CYCLE POWER PLANTS
FOSSIL-FUEL POWER PLANTS
GEOTHERMAL POWER PLANTS
NUCLEAR POWER PLANTS
OCEAN THERMAL POWER PLANTS
REFUSE-FUELED POWER PLANTS
SOLAR THERMAL POWER PLANTS
Cooling Systems
Effects of copper speciation on aquatic ecosystems, 8:23429 (R:US)
Review of the effects of the Clean Water Act on cooling-system selection by the steam-electric industry, 8:23427 (R:US)
Cooling Towers
BECKDRY; dry cooling for steam-electric plants (CDC6600,7600; FORTRAN IV), 8:23398 (R:US)
Environmental Impacts
Improved method for predicting seasonal and annual shadowing from cooling-tower plumes, 8:24401 (R:US)
Optimization
STOPS; power system short-term optimization (IBM303x,360,370; FORTRAN IV), 8:23402 (R:US)
Pipes
SUPAN; analysis of beam-type piping supports (CDC7600; FORTRAN IV), 8:23400 (R:US)
Pollution Regulations
Review of the effects of the Clean Water Act on cooling-system selection by the steam-electric industry, 8:23427 (R:US)

THERMAL SHIELDS
Design
Thermal design considerations of shields for levitated coils, 8:25024 (J:US)

THERMAL STORAGE
See HEAT STORAGE

THERMIONIC CELLS
See THERMIONIC CONVERTERS

THERMIONIC CONVERTERS
Cogeneration
Thermionic cogeneration burner assessment study. First quarterly technical progress report, October-December, 1982, 8:23858 (R:US)
Mathematical Models
Thermionic cogeneration burner assessment study. First quarterly technical progress report, October-December, 1982, 8:23858 (R:US)
Performance
Thermionic cogeneration burner assessment study. First quarterly technical progress report, October-December, 1982, 8:23858 (R:US)
Uses
Thermionic cogeneration burner assessment study. First quarterly technical progress report, October-December, 1982, 8:23858 (R:US)

THERMIONIC GENERATORS
See THERMIONIC CONVERTERS

THERMOCHEMICAL HEAT STORAGE
Feasibility Studies
Energy storage via the carbothermic reduction of sodium oxide, 8:23667 (R:US)

THERMODYNAMICS
Research Programs
Topics in finite time thermodynamics, 8:24158 (R:US)
THERMOELECTRIC CELLS
See THERMOELECTRIC GENERATORS
THERMOELECTRIC CONVERTERS
See THERMOELECTRIC GENERATORS
THERMOELECTRIC GENERATORS
Radioisotope Heat Sources
Heat-source specification 500 watt(e) RTG, 8:23201 (R:US)
THERMONUCLEAR DEVICES
See also OPEN PLASMA DEVICES
Divertors
Erosion and redeposition analysis for limiter and divertor impurity control systems, 8:24878 (J:NL)
Fabrication
Fabrication of the torus assembly for the OHTE confinement experiment, 8:25213 (J:US)
Limiters
Erosion and redeposition analysis for limiter and divertor impurity control systems, 8:24878 (J:NL)
Protective Coatings
Analysis of the plasma impurity influx from alkali-metal coatings for fusion reactor applications, 8:24877 (J:NL)
THERMONUCLEAR FUELS
Alternate-fuel reactor studies, 8:24817 (R:US)
Recycling
Simple theory for maximum H inventory and release: a new transport parameter, 8:24798 (J:NL)
THERMONUCLEAR POWER PLANTS
Design
Demonstration tokamak-power-plant study (DEMO), 8:24816 (R:US)
Forecasting
Electric power from near-term fusion reactors, 8:24937 (J:US)
Power Generation
Electric power from near-term fusion reactors, 8:24937 (J:US)
THERMONUCLEAR REACTIONS
Reaction Kinetics
STEEP4; thermonuclear reaction rates (CDC6600,7600; FORTRAN IV), 8:24758 (R:US)
THERMONUCLEAR REACTOR COOLING SYSTEMS
Heat Transfer
Heat-transfer characteristics of flowing and stationary particle-bed-type fusion-reactor blankets, 8:24840 (R:US)
THERMONUCLEAR REACTOR MATERIALS
Thermal fatigue of a TiB_2 coated, long pulse, high heat flux component, 8:24910 (J:NL)
Embrittlement
Helium embrittlement of stainless steels at ambient temperature, 8:24911 (J:US)
Gettering
Studies of chromium gettering, 8:24903 (J:NL)
Materials Testing
Role of radiation-damage analysis in the fusion program, 8:24830 (R:US)
Physical Radiation Effects
Effects of irradiation on ceramics for fusion-reactor applications, 8:23992 (R:US)
Reviews
Advanced materials for in-vessel components, 8:24902 (J:NL)
Surface Cleaning
Light impurity removal from stainless steel by atomic hydrogen, 8:24881 (J:NL)
Studies of unipolar arcing in the mini-torus, 8:24884 (J:NL)
Test Facilities
Improved materials testing module for magnetic fusion, 8:25220 (J:US)
Thermal Analysis
Scaling laws for thermal behavior of inertially cooled limiters allowing for temperature-dependent material properties, 8:24895 (J:NL)
THERMONUCLEAR REACTOR WALLS
See also FIRST WALL
Cleaning
Wall conditioning of the JIPP T-II torus by AC discharge cleaning, 8:24883 (J:NL)
Erosion
Initiation of arcing at a plasma-wall contact, 8:24888 (J:NL)
Losses
Rates of loss of material from inertial fusion reactor surfaces exposed to pellet emissions, 8:25155 (J:US)
Recycling
Some factors affecting the dynamics of a plasma-wall interaction simulator, 8:24899 (J:NL)
Sputtering
Physical sputtering code for fusion applications, 8:25172 (J:US)
Wall Loading
Changes in limiter surface temperature profiles for small radius plasmas in Doublet III, 8:24896 (J:NL)
Derivation of the power deposition on limiters and divertor targets from time and space resolved thermographical measurements, 8:24892 (J:NL)
Some factors affecting the dynamics of a plasma-wall interaction simulator, 8:24899 (J:NL)
Thermal processes in tokamaks of the next generation and future reactors, 8:24889 (J:NL)
THERMONUCLEAR REACTORS
For use in cases where certain aspects of either hypothetical or real thermonuclear reactors are discussed.
See also I-BEAM TYPE REACTORS
LASER FUSION REACTORS
MAGNETIC MIRROR TYPE REACTORS
STELLARATOR TYPE REACTORS
TOKAMAK TYPE REACTORS
Breeding Blankets
Initial progress in the first wall, blanket and shield engineering test program for magnetically confined fusion power reactors, 8:24969 (J:US)
Low tritium inventory, phase change blanket concept for magnetic fusion, 8:24973 (J:US)
Cathodes
Testing of water-cooled cathodes on the Westinghouse high surface heat flux test facility, 8:25216 (J:US)
Data Transmission
Method for transmitting analog data over a fiber-optic link, 8:25194 (J:US)
Degassing
Initial thermal outgassing properties of aluminium between 20/degree/c and 320/degree/c, 8:25161 (J:US)
Design
Prototype moving-ring reactor, 8:24933 (J:US)
Electrical Equipment
Reliable trigger unit for rail gap swtiches, 8:25076 (J:US)
Engineering
Initial progress in the first wall, blanket and shield engineering test program for magnetically confined fusion power reactors, 8:24969 (J:US)
First Wall
Initial progress in the first wall, blanket and shield engineering test program for magnetically confined fusion power reactors, 8:24969 (J:US)
Hybrid Systems
Prospects of energy transformation between fusion reactor and OTEC plant, 8:25132 (J:US)
Hydrogen Production
An operating high temperature (1000°C) electrolysis demonstration unit, 8:23213 (J:US)
Joule Heating
OHTE reactor concepts, 8:24931 (J:US)
Limiters
Limiter, of dense and high thermal conducting material, for a fusion reactor, 8:25159 (J:US)
Magnetic Field Configurations
Pf coil current sheets for circular section tori to produce specified internal fields, 8:24993 (J:US)
Maintenance
Challenges of designing fusion reactors for remote maintainability, 8:24950 (J:US)
Measuring Instruments
Hardening of instruments for fusion reactors, 8:24810 (J:US)
Neutral Atom Beam Injection
Future needs for neutral beams in fusion, 8:25107 (J:US)

Nuclear Engineering
EPRI fusion program and its thrust in fusion engineering, 8:25157 (J:US)
Pellet Injection
D/sub 2/ - pellet injection system, 8:25119 (J:US)
Planning
EPRI fusion program and its thrust in fusion engineering, 8:25157 (J:US)
Proceedings
Proceedings - 9th symposium on engineering problems of fusion research, 8:24982 (J:US)
Reactor Operation
Optimization of sequential control in operation of fusion device, 8:25180 (J:US)
Reactor Safety
Engineering challenges of underground contained fusion, 8:24938 (J:US)
Remote Handling
Challenges of designing fusion reactors for remote maintainability, 8:24950 (J:US)
Shielding
Effect of curing condition on the concrete moisture retention and its shielding implication for the design of fusion facilities, 8:24924 (J:US)
Shields
Initial progress in the first wall, blanket and shield engineering test program for magnetically confined fusion power reactors, 8:24969 (J:US)
Technology Assessment
Beginning steps toward fusion technology development, 8:24983 (J:US)
Thermonuclear Fuels
Alternate-fuel reactor studies, 8:24817 (R:US)
Uses
An operating high temperature (1000°C) electrolysis demonstration unit, 8:23213 (J:US)
Vacuum Systems
Sensitivity of commercial ion gage tubes, 8:25221 (J:US)

THERMONUCLEAR WEAPONS
See NUCLEAR WEAPONS

THERMOPHOTOVOLTAIC CONVERTERS
Design
Thermovoltaic power source, 8:23287 (P:US)

THERMOSPHERE
Computerized Simulation
Computer model of chemistry and dynamics of the mesosphere, thermosphere, and ionosphere, 8:24508 (R:US)

THETA PINCH
Equilibrium
Nonlinear theta-pinch equilibria, 8:24801 (J:GB)

THIO COMPOUNDS
See ORGANIC SULFUR COMPOUNDS

THIOETHERS
See SULFIDES

THORIUM 230
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)

THORIUM 234
Chelating Agents
Investigations on the biological behaviour and the decorporation of ^{234}Th in the rat, 8:24370 (R:DE:In German)
Excretion
Investigations on the biological behaviour and the decorporation of ^{234}Th in the rat, 8:24370 (R:DE:In German)
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)
Radionuclide Kinetics
Investigations on the biological behaviour and the decorporation of ^{234}Th in the rat, 8:24370 (R:DE:In German)

THORIUM B
See LEAD 212

THORIUM BROMIDES
Absorption Spectra
Optical spectroscopy and electron paramagnetic resonance of Pa^{4+} in $ThBr_4$ and $ThCl_4$ crystals, 8:23889 (J:US)
Crystal Field
Optical spectroscopy and electron paramagnetic resonance of Pa^{4+} in $ThBr_4$ and $ThCl_4$ crystals, 8:23889 (J:US)

THORIUM CHLORIDES
Absorption Spectra
Optical spectroscopy and electron paramagnetic resonance of Pa^{4+} in $ThBr_4$ and $ThCl_4$ crystals, 8:23889 (J:US)
Crystal Field
Optical spectroscopy and electron paramagnetic resonance of Pa^{4+} in $ThBr_4$ and $ThCl_4$ crystals, 8:23889 (J:US)

THREE MILE ISLAND-2 REACTOR
Coolant Cleanup Systems
Interim report on the TMI-2 purification filter examination, 8:23496 (R:US)
Damage
Joint TMI-2 information and examination program: EPRI participation and support, 1982 progress and 1983 program plan, 8:23615 (R:US)
Decontamination
EPICOR-II resin/linear research plan, 8:23608 (R:US)
Joint TMI-2 information and examination program: EPRI participation and support, 1982 progress and 1983 program plan, 8:23615 (R:US)
Filters
Interim report on the TMI-2 purification filter examination, 8:23496 (R:US)
Radioactive Waste Processing
EPICOR-II resin/linear research plan, 8:23608 (R:US)
Submerged demineralize system processing of TMI-2 accident waste water, 8:23616 (R:US)
Radioactivity Transport
Joint TMI-2 information and examination program: EPRI participation and support, 1982 progress and 1983 program plan, 8:23615 (R:US)
Reactor Cores
Quick Look inspection: report on the insertion of a camera into the TMI-2 reactor vessel through a leadscrew opening, 8:23504 (R:US)
TMI-2 core-examination program: INEL facilities readiness study, 8:23607 (R:US)
Remote Viewing Equipment
Quick Look inspection: report on the insertion of a camera into the TMI-2 reactor vessel through a leadscrew opening, 8:23504 (R:US)

THYRISTORS
Feasibility Studies
Development of large-scale thyristor dc circuit breaker, 8:25059 (J:US)
Ion Implantation
Ion implantation in silicon, 8:24208 (RA:DE:In German)

TIDAL POWER
Bibliographies
Solar Energy Update: a current awareness journal, 8:23246 (R:US)

TIGHT SANDS
See SANDSTONES

TIME PROJECTION CHAMBERS
See PROJECTION SPARK CHAMBERS

TIME-SERIES ANALYSIS
Computer Codes
MESA; maximum entropy time series analysis (IBM360,370; FORTRAN IV), 8:25250 (R:US)

TIN
Catalytic Effects
Oil-soluble coal-liquefaction catalyst screening, 8:22936 (R:US)

TIN 112 TARGET
Tin 120 Reactions
Neutron pair transfer between tin isotopes, 8:24674 (RA:DE:In German)

TIN 120 REACTIONS
Transfer Reactions
Neutron pair transfer between tin isotopes, 8:24674 (RA:DE:In German)
TIN 120 TARGET
Pion Minus Reactions
Los Alamos: nuclear monopole, 8:24680 (J:XC)
TIN 124 TARGET
Argon 40 Reactions
Measurement of neutron multiplicity distributions with scintillator tank, 8:24198 (RA:DE:In German)
TIN BASE ALLOYS
Corrosion
Sea water corrosion of two-phase Cu-10Ni-8Sn, 8:23897 (RA:US)
Fermi Level
Fermi-surface properties of $CeSn_3$ and related compounds ($LaSn_3$), 8:23947 (R:US)
TITANIUM
Biological Fouling
OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J:US)
Corrosion
OTEC biofouling, corrosion, and materials study from a moored platform at Punta Tuna, Puerto Rico - 1. - fouling resistance, 8:23310 (J:US)
Electron Collisions
Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets, 8:24546 (R:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Sputtering
Behavior of hot titanium getters at the plasma edge in tokamaks, 8:24905 (J:NL)
TITANIUM 50 TARGET
Alpha Reactions
Error propagation in fitting optical potentials to elastic heavy-ion scattering, 8:24655 (RA:DE:In German)
Error propagation in the phase analysis of elastic scattering data, 8:24656 (RA:DE:In German)
TITANIUM ALLOYS
See also TITANIUM BASE ALLOYS
Corrosion
Corrosion of materials in a clay environment, 8:23145 (RA:DE)
TITANIUM BASE ALLOYS
Physical Radiation Effects
Segregation in irradiated titanium alloys (Ion irradiation (2.1 MeV Ar^+) of Ti-6Al-4V, Ti-8Al-1V-Mo, Ti-3V and Ti-8.7 Al), 8:23931 (R:US)
TITANIUM BORIDES
Compacting
First quarterly report of the DARPA dynamic synthesis and consolidation program, 8:24008 (R:US)
Fatigue
Thermal fatigue of a TiB_2 coated, long pulse, high heat flux component, 8:24910 (J:NL)
TITANIUM CARBIDES
Coatings
Outgassing characteristics of TiC coated materials, 8:24909 (J:NL)
Compacting
First quarterly report of the DARPA dynamic synthesis and consolidation program, 8:24008 (R:US)
Degassing
Outgassing characteristics of TiC coated materials, 8:24909 (J:NL)
Surface Coating
All TiC coated limiter experiment in the JIPP T-II tokamak, 8:24860 (J:NL)
Vapor Deposited Coatings
Thermal and mechanical testings of TiC and TiN coating materials with Mo substrates, 8:25162 (J:US)
TITANIUM NITRIDES
Vapor Deposited Coatings
Thermal and mechanical testings of TiC and TiN coating materials with Mo substrates, 8:25162 (J:US)
TITANIUM OXIDES
Sorptive Properties
Hydrides of oxygen-stabilized intermetallic phases (Zr_3V_3O; Ti_4M_3O/sub x/ (M = Fe, Co, Ni)), 8:23998 (R:US)
TMPN
See ORGANIC OXYGEN COMPOUNDS
PIPERIDINES
TMR REACTORS
Design
Fission-suppressed hybrid reactor: the fusion breeder, 8:24838 (R:US)
Direct Energy Converters
Direct energy converter for UW tandem mirror reactor, 8:25134 (J:US)
Superconducting Magnets
Magnet system for a thermal barrier Tandem Mirror Reactor, 8:24989 (J:US)
TMTSF
Coupling Constants
Theory of anion ordering in TMTSF compounds, 8:24027 (R:US)
Superconductivity
Some basic questions in organic superconductivity, 8:24028 (R:US)
TMX DEVICES
Design
Overview of the Tandem Mirror Experiment-Upgrade, 8:24941 (J:US)
ECR Heating
Beam waveguide launcher for high power ecrh heating in large tandem mirror machines, 8:25098 (J:US)
Magnet Coils
TMX upgrade magnet system mechanical issues, 8:24845 (R:US)
Plasma Instability
Criterion for Baldwin instability in a symmetric tandem mirror with hot-electron end plugs, 8:24774 (R:US)
Power Supplies
Application of power factor correction in the Tandem Mirror Experiment upgrade magnet power supply, 8:25069 (J:US)
Superconducting Magnets
TMX-axisymmetric magnet set design study, 8:24985 (J:US)
Test Facilities
Plasma engineering considerations for an inside-barrier tandem mirror test facility, 8:25165 (J:US)
Timing Circuits
Diagnostic timing system for the TMX-Upgrade, 8:25170 (J:US)
TOBACCO PRODUCTS
Combustion Products
Tobacco smoke in occupied spaces: ventilation requirements. Paper 81.22.4, 8:23831 (J:US)
TOBACCO SMOKES
Biological Effects
Smoking, infant birthweight and lead burden in developing children, 8:24459 (J:US)
TOKAMAK DEVICES
See also ALCATOR DEVICE
ASDEX TOKAMAK
SPHEROMAK DEVICES
TEXT DEVICES
TEXTOR TOKAMAK
TFR TOKAMAK
Alfven Waves
R.f. system for Alfven wave heating of the TCA tokamak, 8:24926 (J:US)
Cleaning
ECR discharge cleaning experiment in the JIPP T-II, 8:24880 (J:NL)
Control Systems
Experimental study on feedback control system of plasma position, 8:25181 (J:US)
Impurity control in the Varennes tokamak, 8:24862 (J:NL)

Current-Drive Heating
Operating tokamaks with steady-state toroidal current, 8:24765 (R:US)
Ray-tracing study of electron-cyclotron heating in toroidal geometry, 8:24767 (R:US)
Some novel features of the ordinary-mode electron-cyclotron resonance heating of tokamak plasmas, 8:24771 (R:US)
Design
Generation of multipole nulls in a tokamak geometry, 8:24995 (J:US)
Divertors
Monte Carlo simulation of the neutral gas density and temperature distribution due to the recycling processes at a poloidal, toroidal or mushroom limiter and at the divertor plate of a poloidal divertor, 8:24874 (J:NL)
ECR Heating
Ray-tracing study of electron-cyclotron heating in toroidal geometry, 8:24767 (R:US)
Some novel features of the ordinary-mode electron-cyclotron resonance heating of tokamak plasmas, 8:24771 (R:US)
Eddy Currents
Eddy current load estimation for toroidal shells as a result of plasma disruptions, 8:24990 (J:US)
Electrical Transients
Calculation of transient current response of a set of coupled circuits using an eigenvalue technique, 8:24992 (J:US)
Feedback
Feedback stabilization of tokamaks against slow axisymmetric MHD instabilities, 8:24914 (J:GB)
Getters
Behavior of hot titanium getters at the plasma edge in tokamaks, 8:24905 (J:NL)
Impurities
ECR discharge cleaning experiment in the JIPP T-II, 8:24880 (J:NL)
Impurity control in the Varennes tokamak, 8:24862 (J:NL)
Impurity detection in the APEX tokamak by in-situ doppler shift laser fluorescence spectroscopy, 8:24812 (J:US)
Structure of metallic coatings for impurity control in MACROTOR, 8:24882 (J:NL)
Studies of unipolar arcing in the mini-torus, 8:24884 (J:NL)
Limiters
All TiC coated limiter experiment in the JIPP T-II tokamak, 8:24860 (J:NL)
Damage and modifications in the Frascati tokamak limiter, 8:24897 (J:NL)
Dependence of hydrogen recycling on molecular effects in tokamaks, 8:24872 (J:NL)
Design and mechanical analysis of TORE SUPRA vacuum vessels and limiters, 8:25207 (J:US)
Experimental studies on pump limiters, 8:24850 (J:NL)
Infrared thermography of a pump limiter on MACROTOR, 8:24854 (J:NL)
Large area pumped limiter experiments in MACROTOR, 8:24852 (J:NL)
Physics of particle exhaust in pump limiters, 8:24853 (J:NL)
Recycling of metal impurities in the limiter shadow region of a tokamak, 8:24875 (J:NL)
Magnet Coils
Normal conducting steady-state toroidal magnet systems for large tokamaks, 8:24997 (J:US)
Magnetic Field Configurations
Tokamak-stellarator hybrid configurations with unlinked helical coils, 8:24832 (R:JP)
Magnetic Islands
Formation of magnetic islands and ergodic magnetic layers in wall-lapping plasma as a non-divertor concept for a reactor-relevant tokamak, 8:24851 (J:NL)
Modular Structures
Modular first wall concept for steady state operation, 8:24965 (J:US)
Neutral Beam Sources
Highlights of the Zephyr neutral beam injection system conceptual design, 8:25084 (J:US)
Plasma Density
Calculation of hydrogen density in toroidal plasma, 8:24793 (J:NL)
Poloidal Divertors
Computational study of operating regimes for poloidal divertors, 8:24855 (J:NL)
Models for poloidal divertors, 8:24868 (J:NL)
Power Supplies
Development of large-scale thyristor dc circuit breaker, 8:25059 (J:US)
Power supplies for the Varennes tokamak a quasi-continuous operation experiment, 8:25065 (J:US)
Sensitivity Analysis
Sensitivity study code for tokamak devices, 8:24935 (J:US)
Stability
Feedback stabilization of tokamaks against slow axisymmetric MHD instabilities, 8:24914 (J:GB)
Superconducting Magnets
Advances in the cluster test facility and the test module coil development, 8:25056 (J:US)
Evaluation of the use of a normal shield to reduce transient field induced losses in tokamak superconducting coils, 8:24988 (J:US)
Large-current conductor development for superconducting poloidal coils, 8:25057 (J:US)
Tearing Instability
Effects of toroidicity on resistive tearing modes, 8:24768 (R:US)
Thermonuclear Reactor Materials
Scaling laws for thermal behavior of inertially cooled limiters allowing for temperature-dependent material properties, 8:24895 (J:NL)
Wall material characteristics in reacting plasma modelling, 8:24876 (J:NL)
Thermonuclear Reactor Walls
Experimental observation of a non-constant recombination coefficient - H/Pd(110); possible implications for hydrogen recycle in tokamaks, 8:24900 (J:NL)
Vacuum Systems
Design, fabrication and testing of a model heating and cooling system for a vacuum vessel, 8:24927 (J:US)
Design and mechanical analysis of TORE SUPRA vacuum vessels and limiters, 8:25207 (J:US)

TOKAMAK FONTENAY-AUX-ROSES
See TFR TOKAMAK

TOKAMAK FUSION TEST REACTOR
See TFTR REACTORS

TOKAMAK TYPE REACTORS
See also DOUBLET REACTORS
INTOR TOKAMAK
ISX TOKAMAK
JET REACTORS
JT-60 REACTORS
PLT DEVICES
STARFIRE TOKAMAK
TFTR REACTORS
Breeding Blankets
Helium-cooled, solid breeder blanket design for a tokamak fusion reactor, 8:24981 (J:US)
Cooling Systems
Enhanced cooling with helium channels in the TF coil casing for FED, 8:25025 (J:US)
Cost
Tokamak reactor cost model based on STARFIRE/WILDCAT costing, 8:24818 (R:US)
Degassing
Electron assisted methane production on carbon surfaces, 8:25163 (J:US)
Design
Demonstration tokamak-power-plant study (DEMO), 8:24816 (R:US)
Prospects of low activation fusion reactor design, 8:24934 (J:US)
Torus design for the fusion engineering device (FED), 8:25050 (J:US)
Engineering
Engineering aspects of a D-D commercial tokamak reactor, 8:24951 (J:US)

First Wall
Effect of irradiation creep, swelling, wall erosion and embrittlement on the fatigue life of a tokamak first wall, 8:24827 (R:US)
Key design issues in the definition of the fusion engineering device (FED) first wall and limiter features, 8:24961 (J:US)
Fuel Injection Systems
Mechanical configuration and shielding for FED fuel injectors and diagnostic instrumentation, 8:24962 (J:US)
Fuel Systems
Pneumatic hydrogen pellet injector development at Oak Ridge National Laboratory, 8:25118 (J:US)
ICR Heating
FED and starfire icrh systems, 8:25099 (J:US)
Icrh system characteristics, 8:25100 (J:US)
Impurities
Redeposition of the sputtered surface in limiters, 8:25166 (J:US)
Joule Heating
Studies on stability and a.c. losses of filamentary conductors for fast ramp rate ohmic heating coils, 8:25041 (J:US)
Limiters
Key design issues in the definition of the fusion engineering device (FED) first wall and limiter features, 8:24961 (J:US)
Tokamak limiter design, 8:25200 (J:US)
Magnet Coils
Considerations for replacing PF coils on FED, 8:25047 (J:US)
Design and fabrication considerations for normal copper pf coils located inside tf coils to facilitate replacement, 8:24918 (J:US)
Optimisation of the poloidal field coil system in pulsed tokamaks, 8:24996 (J:US)
Magnetic Field Configurations
Shaping and controlling Dee-shaped tokamak plasmas, 8:25058 (J:US)
Materials Testing
Thermal and mechanical testings of TiC and TiN coating materials with Mo substrates, 8:25162 (J:US)
Mechanical Structures
Structural behavior of the Bitter plate tf magnet for the Zephyr ignition test reactor, 8:25005 (J:US)
Neutral Atom Beam Injection
Optimal neutral beam heating scenario for FED, 8:24814 (J:US)
Operation
Methodology for investigating subsystem interactions in a tokamak fusion reactor, 8:24936 (J:US)
Pellet Injection
Mechanical configuration and shielding for FED fuel injectors and diagnostic instrumentation, 8:24962 (J:US)
Pneumatic hydrogen pellet injector development at Oak Ridge National Laboratory, 8:25118 (J:US)
Plasma Heating
Optimal neutral beam heating scenario for FED, 8:24814 (J:US)
Poloidal Divertors
Ripple reduction poloidal field coils for tokamak fusion reactors, 8:24987 (J:US)
Power Losses
Eddy current calculations for the tokamak fusion reactor through fields harmonics content, 8:24998 (J:US)
Power Supplies
Power supply for the poloidal coil of tokamak fusion reactor, 8:25074 (J:US)
Program Management
Tokamak Fusion Test Reactor Project, 8:24828 (R:US)
Reactor Fueling
Pneumatic hydrogen pellet injector development at Oak Ridge National Laboratory, 8:25118 (J:US)
Shields
Mechanical configuration and shielding for FED fuel injectors and diagnostic instrumentation, 8:24962 (J:US)
Superconducting Magnets
Development of superconducting poloidal field coils for tokamak reactors, 8:25043 (J:US)
Engineering feasibility challenges for the magnet community, 8:25033 (J:US)
Model of toroidal magnet systems as orthotropic shells of finite thickness, 8:24991 (J:US)
Pool boiling helium heat transfer from two large monolithic copper stabilizers, 8:25011 (J:US)
Structural design procedures for FED magnets, 8:25035 (J:US)
Supports
Development of tf coil support concepts by design methodology in the case of a Bitter-type magnet, 8:25004 (J:US)

TOLUENE
Solvent Properties
Supercritical gas extraction to separate liquefied coal from residual solids, 8:22927 (R:US)
Thermodynamic Properties
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R:US)

TOOLS
Not for EDUCATIONAL TOOLS.
See also MACHINE TOOLS
Design
Analysis and thermal-design improvements of downhole tools for use in hot-dry wells, 8:23372 (R:US)

TOP ACCIDENTS
See TRANSIENT OVERPOWER ACCIDENTS

TOROIDAL SCREW PINCH DEVICES
Pressure Vessels
Ceramic torodail vacuum chamber and wall conditioning for the ETL-TPE-2 experiment, 8:25205 (J:US)
Vacuum Systems
Ceramic torodail vacuum chamber and wall conditioning for the ETL-TPE-2 experiment, 8:25205 (J:US)

TOROIDAL THETA PINCH DEVICES
Plasma Simulation
Flux loss and heating during the formation of a field-reversed configuration, 8:24792 (J:US)

TOTAL ENERGY SYSTEMS
Computerized Simulation
TDIST2; community energy consumption analysis (IBM370,303x; FORTRAN IV, IBM FORTRAN G compiler), 8:23872 (R:US)
Demonstration Programs
Solar Total-Energy Project, Shenandoah, Georgia site. Annual technical progress report, July 1, 1980-June 30, 1982, 8:23301 (R:US)
Thermal Energy Storage Equipment
SOLTES1; thermal energy systems simulation (CDC6600,7600; FORTRAN IV (99%) and COMPASS (1%)), 8:23663 (R:US)

TOTAL-ABSORPTION SPECTROMETERS
See SHOWER COUNTERS

TOWER FOCUS COLLECTORS
Hybrid Systems
Economies of scale in the production of steam with solar thermal-fossil boiler hybrid systems, 8:23253 (R:US)

TOWER FOCUS POWER PLANTS
See also BARSTOW SOLAR PILOT PLANT
Financing
Investor and federal treasury returns from investing in solar-thermal energy, 8:23307 (R:US)

TPC
See PROJECTION SPARK CHAMBERS

TRACER TECHNIQUES
Meetings
Proceedings of the workshop on nuclear techniques in hydrology (Lead abstract), 8:24483 (R:IN)

TRACHEA
Neoplasms
Induction and progression of neoplasia in tracheal epithelium, 8:24443 (RA:US)

TRACK DETECTORS (DIELECTRIC)
See DIELECTRIC TRACK DETECTORS

TRANSFER (HEAT)
See HEAT TRANSFER

TRANSFER (IN ENVIRONMENT)
See RADIONUCLIDE MIGRATION

TRANSFERASES
Code number 2.
DNA-Cloning
Regulation of gene expression, 8:24449 (RA:US)
TRANSFORMATIONS (ONCOGENIC)
See ONCOGENIC TRANSFORMATIONS
TRANSFORMER OILS
See INSULATING OILS
TRANSIENT OVERPOWER ACCIDENTS
Status of fast-breeder-reactor safety, 8:23602 (R:US)
Fuel Element Failure
Analyses with the FSTATE code: fuel performance in destructive in-pile experiments, 8:23588 (R:US)
PFR/TREAT CO1 and LO1 experiments, 8:23593 (R:US)
TRANSIENT REACTOR TEST FACILITY
See TREAT REACTOR
TRANSIENTS
Fuel Element Failure
International over-ramp project at Studsvik, 8:23483 (RA:US)
TRANSITION ELEMENT COMPOUNDS
See also MOLYBDENUM COMPOUNDS
Optical Properties
Optical properties of solids for solar energy conversion, 8:24006 (R:US)
TRANSITION ELEMENTS
See also CHROMIUM
COBALT
COPPER
GOLD
IRON
MANGANESE
MOLYBDENUM
NICKEL
NIOBIUM
SILVER
TECHNETIUM
TITANIUM
TUNGSTEN
VANADIUM
YTTRIUM
Electric Conductivity
Universal behavior in the electrical conductivity of strong-scattering expanded fluid metals, 8:24572 (J:US)
Electronic Structure
Universal behavior in the electrical conductivity of strong-scattering expanded fluid metals, 8:24572 (J:US)
TRANSITION METALS
See TRANSITION ELEMENTS
TRANSMISSION ELECTRON MICROSCOPY
Imaging and analysis of surfaces using diffracted electrons, 8:24068 (BA:US)
TRANSMISSION (HEAT)
See HEAT TRANSFER
TRANSMISSION LINES
See POWER TRANSMISSION LINES
TRANSMISSION TOWERS
See POWER TRANSMISSION TOWERS
TRANSPORT (CHARGED-PARTICLE)
See CHARGED-PARTICLE TRANSPORT
TRANSPORT (RADIATION)
See RADIATION TRANSPORT
TRANSPORT THEORY
Sturm-Liouville Equation
Linear transport theory and an indefinite Sturm-Liouville problem, 8:24722 (R:US)
Trapping
Electronic excited state transport among molecules distributed randomly in a finite volume, 8:24551 (J:US)
TRANSPORTATION SECTOR
Energy Consumption
Forecasts of intercity passenger demand and energy use through 2000, 8:23843 (R:US)
Mathematical Models
Forecasts of intercity passenger demand and energy use through 2000, 8:23843 (R:US)
Socio-technical scenarios for long-range transportation technology comparisons, 8:23841 (R:US)
TRANSURANIUM WASTES
See ALPHA-BEARING WASTES
TRAVEL
Cost Recovery
Receipt and use of half-fare airline coupons at selected Department of Energy field locations, 8:25229 (R:US)
TREAT REACTOR
Loss of Flow
New aspects in the analysis of fuel dynamics during loss-of-flow transients, 8:23645 (J:US)
Rod Drop Accidents
A method for analysis of reactivity insertion accidents in transient reactors, 8:23570 (J:US)
TRETAMINE
See ALKYLATING AGENTS
1,3,5-TRIAMINO-2,4,6-TRINITROBENZENE
See TATB
TRIANGULAR CONFIGURATION
Integrals
Note on cubature over a triangle of a function having specified singularities, 8:25268 (R:US)
TRIETHYLENEMELAMINE
See ALKYLATING AGENTS
TRIPLET PARTICLES
See QUARKS
TRITIATED COMPOUNDS
See TRITIUM COMPOUNDS
TRITICUM
See WHEAT
TRITIUM
Containment
Overview of United States tritium programs, 8:24833 (RA:JP)
Research program and present status of tritium technology in Japan Atomic Energy Research Institute, 8:24834 (RA:JP)
Diffusion
Tritium permeation in fusion reactor first walls, 8:24901 (J:NL)
Environmental Transport
TRITMOD; advection model of tritium dispersion (IBM360; CSMP), 8:24261 (R:US)
Impurities
Developments in the fuel cleanup system for the tritium system test assembly, 8:25130 (J:US)
Isotope Effects
NMR study of phase transitions in VT/sub 0.50/ and VT/sub 0.75/, 8:24010 (J:US)
Isotope Separation
Design study of fuel circulating system using Pd alloy membrane isotope separation method, 8:23199 (RA:JP)
Materials Handling
Development of tritium technology for the magnetic fusion energy program, 8:25129 (J:US)
Physical Properties
Status of physical data on tritium and its behavior in fusion related systems, 8:25126 (J:US)
Research Programs
Development of tritium technology for the United States Magnetic Fusion Energy Program and an update on the Tritium Systems Test Assembly, 8:24835 (RA:JP)
Overview of United States tritium programs, 8:24833 (RA:JP)
Research program and present status of tritium technology in Japan Atomic Energy Research Institute, 8:24834 (RA:JP)
Separation Processes
Analysis of the separation of protium from blanket tritium-product streams, 8:24825 (R:US)
Storage
Development of tritium technology for the United States Magnetic Fusion Energy Program and an update on the Tritium Systems Test Assembly, 8:24835 (RA:JP)
Test Facilities
Development of tritium technology for the United States Magnetic Fusion Energy Program and an update on the Tritium Systems Test Assembly, 8:24835 (RA:JP)
TRITIUM COMPOUNDS
Chemical Preparation
NMR study of phase transitions in VT/sub 0.50/ and VT/sub 0.75/, 8:24010 (J:US)

Phase Studies
NMR study of phase transitions in VT/sub 0.50/ and VT/sub 0.75/, 8:24010 (J:US)
TRITIUM RECOVERY
In thermonuclear reactors and/or devices.
Compact tritium removal equipment for air cleanup of glove box, 8:25124 (J:US)
In-situ tritium recovery from Li/sub 17/Pb/sub 83/ breeding blanket, 8:25127 (J:US)
New process to remove tritium from glove box atmospheres (TROC (Tritium Removal with Organic Compounds) Process), 8:25125 (J:US)
Overview of United States tritium programs, 8:24833 (RA:JP)
Research program and present status of tritium technology in Japan Atomic Energy Research Institute, 8:24834 (RA:JP)
Adsorbents
Properties of yttrium sorbers which improve tritium sorption rate from liquid lithium, 8:25131 (J:US)
TROPOSPHERE
Ozone
Balance of the tropospheric ozone and its relation to stratospheric intrusions indicated by cosmogenic radionuclides. Technical progress report, November 1, 1979-June 30, 1980, 8:24232 (R:US)
TRU WASTES
See ALPHA-BEARING WASTES
TRX-1
See REVERSE-FIELD PINCH
TUBES (CONDUITS)
See PIPES
TUFF
Petrography
Detailed petrographic descriptions and microprobe data for drill holes USW-G2 and UE25b-1H, Yucca Mountain, Nevada, 8:24485 (R:US)
TUMOR CELLS
Proteins
Tumor cell surface proteins, 8:24321 (RA:US)
Sorting
Polycarbonate filter technique for collection of sorted cells, 8:24326 (J:US)
TUMOR PROMOTERS
Biological Effects
Normal and neoplastic growth in epithelial cells, 8:24444 (RA:US)
TUMOR VIRUSES
See ONCOGENIC VIRUSES
TUMORS
See NEOPLASMS
TUNGSTEN
Electrochemical Corrosion
Corrosion behavior of high density tungsten alloys, 8:23899 (RA:US)
Electron Collisions
Calculated photon spectra at several angles for 5- and 50-MeV electron beams striking solid and gas targets, 8:24546 (R:US)
TUNGSTEN 170
High Spin States
High-spin rotational states in ^{166}Hf and ^{170}W, 8:24689 (RA:DE:In German, English)
TUNGSTEN BASE ALLOYS
Electrochemical Corrosion
Corrosion behavior of high density tungsten alloys, 8:23899 (RA:US)
TUNGSTEN OXIDES
Sorptive Properties
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program, 8:23781 (R:US)
TUNNELS
See also MINE ROADWAYS
Mapping
Sources of compass error in tunnel mapping, 8:24495 (J:US)
TURBINE BLADES
Stress Corrosion
Long time corrosion testing with and without mechanical stress of high temperature alloys for blades of land based gas turbines with high output, 8:23892 (R:DE:In German)
TURBULENT FLOW
Flow Rate
Application of the method of integral relations to the calculation of two-dimensional incompressible turbulent boundary layer, 8:24140 (J:US)
TURTLES
Ecology
Proceedings of a workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of Outer Continental Shelf development, 8:23040 (R:US)
TVA
See TENNESSEE VALLEY AUTHORITY
TWO-PHASE FLOW
Computer Codes
BEACON/MOD3; containment system fluid flow (CDC CYBER176;CDC7600; FORTRAN IV (98%) and COMPASS (2%)), 8:23579 (R:US)
SOLA-DF; transient 2-dimensional 2-phase flow (CDC7600; FORTRAN IV), 8:24136 (R:US)
TYROSINE
Fluorescence
Protein luminescence: the end of the beginning, 8:24319 (RA:US)

U

UCLLL
See LAWRENCE LIVERMORE LABORATORY
UHF RADIATION (01-100 GHZ)
See RADIOWAVE RADIATION
UHF RADIATION (100-1000 MHZ)
See RADIOWAVE RADIATION
UHF RADIATION (LOWER RANGE)
See RADIOWAVE RADIATION
UHF RADIATION (UPPER RANGE)
See RADIOWAVE RADIATION
ULTRAHIGH FREQUENCY RADIATION (01-100 GHZ
See RADIOWAVE RADIATION
ULTRAHIGH FREQUENCY RADIATION (100-1000 M
See RADIOWAVE RADIATION
ULTRAHIGH FREQUENCY RADIATION (LOWER RANG
See RADIOWAVE RADIATION
ULTRAHIGH FREQUENCY RADIATION (UPPER RANG
See RADIOWAVE RADIATION
ULTRASONIC TESTING
Image Processing
Ultrasonic-image reconstruction with surface mapping and synthetic-aperture techniques, 8:24141 (R:US)
ULTRAVIOLET RADIATION
RBE
Lethality in repair-proficient Escherichia coli after 365nm ultraviolet light irradiation is dependent on fluence rate, 8:24393 (J:GB)
Synergism
Roofing asphalts, pitch and UVL carcinogenesis, 8:24453 (R:US)
UNDERGROUND EXPLOSIONS
Seismic Detection
Relationship of body and surface wave magnitudes for small earthquakes and explosions. Scientific report, 8:24223 (R:US)
UNDERGROUND GASIFICATION
See IN-SITU GASIFICATION
UNDERGROUND MINING
See also LONGWALL MINING
ROOM AND PILLAR MINING
Accidents
Toward safer underground coal mines, 8:23009 (R:US)
Continuous Miners
Duty-cycle investigations of continuous miners. Volume I. Final technical report, 8:22974 (R:US)
Geology
Relation of geology to mine roof conditions in the Pocahontas No. 3 coalbed. Information circular/1982, 8:22981 (R:US)

Haulage Equipment
Automated rail-haulage system. Final technical report as of November 30, 1982, 8:22984 (R:US)
Inclined Strata
Modern underground mining technologies for pitching coalbed extraction. Report No. 2. Survey of geological and mining conditions of highly inclined and steep coalbeds, and technologies of working (mining systems) in European coalfields, 8:22976 (R:US)
Mine Roadways
Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls, 8:22978 (R:US)
Mining Equipment
Duty-cycle investigations of continuous miners. Volume II. Instrument manual, 8:22975 (R:US)
Modern underground mining technologies for pitching coalbed extraction. Report No. 2. Survey of geological and mining conditions of highly inclined and steep coalbeds, and technologies of working (mining systems) in European coalfields, 8:22976 (R:US)
Organizational Models
Development and integration of operational planning models for the coal mining industry in the Federal Republic of Germany (short title: Mining planning models), 8:22971 (R:DE:In German)
Productivity
Modern underground mining technologies for pitching coalbed extraction. Report No. 2. Survey of geological and mining conditions of highly inclined and steep coalbeds, and technologies of working (mining systems) in European coalfields, 8:22976 (R:US)
Research Programs
Modern underground mining technologies for pitching coalbed extraction. Report No. 2. Survey of geological and mining conditions of highly inclined and steep coalbeds, and technologies of working (mining systems) in European coalfields, 8:22976 (R:US)
Roofs
Method of investigations, estimation and classification of roofs in mines in the United States of America for the selection of suitable mechanized support for longwalls. Report No. 2. State-of-the-art report on roof rock stability tests and powered support selection systems for longwalls, 8:22978 (R:US)
Relation of geology to mine roof conditions in the Pocahontas No. 3 coalbed. Information circular/1982, 8:22981 (R:US)

UNDERGROUND NUCLEAR POWER PLANTS
See UNDERGROUND NUCLEAR STATIONS

UNDERGROUND NUCLEAR STATIONS
Reactor Safety
Engineering challenges of underground contained fusion, 8:24938 (J:US)

UNDERGROUND POWER TRANSMISSION
Oil-Filled Cables
Electrohydrodynamic pumping in cable pipes. Final report, 8:23435 (R:US)
Increasing pipe-cable section lengths. Final report, 8:23436 (R:US)

UNDERGROUND STORAGE
Abandoned Shafts
Summarized representation of the progress and results of the suitability test of the Konrad pit for final storage of radioactive wastes, 8:23125 (R:DE:In German)

UNDERWATER OPERATIONS
Vehicles
Deep-towed RUM III: a third-generation remote underwater manipulator, 8:24156 (R:US)

UNIFIED GAUGE MODELS
See also WEINBERG-SALAM GAUGE MODEL
Experiment Planning
Grand unified particle physics and a high-intensity intermediate energy machine, 8:24608 (RA:US)
Symmetry Breaking
Spontaneous breaking of global B-L symmetry and matter-antimatter oscillations in grand unified theories, 8:24632 (J:US)

UNION OF SOVIET SOCIALIST REPUBLICS
See USSR

UNITED STATES OF AMERICA
See USA

URANIUM
See also DEPLETED URANIUM
Environmental Transport
Microcracks and energy. Progress report, 1 March 1982-28 February 1983, 8:23096 (R:US)
Mass Spectroscopy
Isotopic analysis of micrometer and submicrometer particles by direct-inlet mass spectrometry, 8:24052 (R:US)
Microstructure
Martensitic transformation in uranium metal and its effect on superconductivity, 8:23983 (J:US)
Mining
Review of uranium miners study and statements of outstanding problems. Technical report, 8:24389 (R:US)
Phase Transformations
Martensitic transformation in uranium metal and its effect on superconductivity, 8:23983 (J:US)
Purex Process
PUBG; purex solvent extraction process model (IBM3033;CDC CYBER175; FORTRAN IV), 8:23111 (R:US)
Quantitative Chemical Analysis
Selected measurement methods for plutonium and uranium in the nuclear fuel cycle, 8:23197 (R:US)
Radiation Detection
Calibration of phoswich detectors for the in vivo measurement of americium, plutonium and uranium: interlaboratory comparison using the Lawrence Livermore calibration, 8:24733 (RA:US)
Radioecological Concentration
Distribution and possible causes of radionuclides in groundwaters of Missouri, 8:24296 (J:US)
Solvent Extraction
Novel diphosphonic and triphosphonic esters and their preparation and uses (Patent), 8:24070 (TG:US)
Superconductivity
Martensitic transformation in uranium metal and its effect on superconductivity, 8:23983 (J:US)

URANIUM 226
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)

URANIUM 230
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)

URANIUM 234
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)

URANIUM 235
Gamma Spectroscopy
Gamma-ray spectrometric determination of UF_6 assay with 1 percent precision for international safeguards. Part 1: product and feed in 1S and 2S sample cylinders, 8:23191 (R:US)

URANIUM 238
Radiation Doses
Basic technique and models for determining exposure rates over uranium-bearing soils. Final report, 8:23185 (R:US)
Radioecological Concentration
Radioactivity in groundwater associated with uranium and phosphate mining and processing, 8:24298 (J:US)
Radiometric Surveys
Recent radiochemistry observations at the Riverton and Maybell tailings piles, 8:23148 (R:US)

URANIUM 238 TARGET
Fission
Fission fragment angular correlation in 300 MeV ^{20}Ne induced reactions on heavy targets, 8:24686 (RA:DE:In German, English)
Krypton 84 Reactions
Multiple Coulomb excitation of very heavy systems within the classical S-matrix theory, 8:24709 (RA:DE:In German, English)
URANIUM ALLOYS
See also URANIUM BASE ALLOYS
Mechanical Properties
Evaluation of structural integrity of IPNS-I and ZING-P' targets, 8:24171 (R:US)
Stress Analysis
Evaluation of structural integrity of IPNS-I and ZING-P' targets, 8:24171 (R:US)
URANIUM BASE ALLOYS
Phase Transformations
Phase transitions in high magnetic fields, 8:23888 (R:US)
URANIUM CARBIDES
Chemical Preparation
Production of spherical UO/sub 2/-UC/sub 2/ for nuclear fuel applications using thermochemical principles, 8:23108 (J:US)
Fuel-Cladding Interactions
Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J:US)
URANIUM DEPOSITS
Exploration
Uranium hydrogeochemical and stream sediment reconnaissance of the Bradfield Canal NTS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23098 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Limon NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:23100 (R:US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Nabesne NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:23099 (R:US)
URANIUM DIOXIDE
Chemical Preparation
Production of spherical UO/sub 2/-UC/sub 2/ for nuclear fuel applications using thermochemical principles, 8:23108 (J:US)
Freezing
Preliminary results of the first four TRAN fuel freezing experiments, 8:23649 (J:US)
Fuel-Cladding Interactions
Relative freezing controlled penetration potential of carbide and oxide fuel, 8:23648 (J:US)
Melting
Preliminary results of the first four TRAN fuel freezing experiments, 8:23649 (J:US)
Sintering
Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982, 8:23473 (R:US)
Thermal Conductivity
Development and demonstration of an advanced extended-burnup fuel-assembly design incorporating urania-gadolinia. Second semi-annual progress report, October 1981-March 1982, 8:23473 (R:US)
Vapor Pressure
In-pile measurement of the total vapor pressure over high-purity UO_2, 8:23547 (J:US)
URANIUM HEXAFLUORIDE
Gamma Spectroscopy
Gamma-ray spectrometric determination of UF_6 assay with 1 percent precision for international safeguards. Part 1: product and feed in 1S and 2S sample cylinders, 8:23191 (R:US)
URANIUM II
See URANIUM 234
URANIUM ISOTOPES
See also URANIUM 226
URANIUM 230
URANIUM 234
URANIUM 235
URANIUM 238
Quantitative Chemical Analysis
Selected measurement methods for plutonium and uranium in the nuclear fuel cycle, 8:23197 (R:US)
URANIUM MILLS
See FEED MATERIALS PLANTS
URANIUM MINES
Radioactivity Transport
UDAD; uranium dispersion & dosimetry model (IBM370,303x; FORTRAN IV (94%), PLL/I (4%), and Assembly language (2%). The only use of PL/I is the auxiliary plotting program, CONTOUR. The only use of Assembly language is the DATE, Gregorian calendar date routine), 8:23187 (R:US)
URANIUM ORES
Geochemistry
Effects of moisture on radon emanation including the effects on diffusion. Open file report oct 79-Nov 81, 8:23097 (R:US)
Solution Mining
In-place leaching of uranium, copper, and evaporites, 8:23101 (R:US)
Standard format and content of license applications, including environmental reports, for in-situ uranium solution mining, 8:23102 (R:US)
Sorptive Properties
Effects of moisture on radon emanation including the effects on diffusion. Open file report oct 79-Nov 81, 8:23097 (R:US)
URANIUM OXIDES
See also URANIUM DIOXIDE
Leaching
Eh and fission product solubilities: two factors in the leaching of UO_2, 8:23109 (J:US)
URANIUM X 1
See THORIUM 234
URANYL COMPOUNDS
Chemical Properties
Synthesis and properties of uranyl monothiocarbamate alkoxides, an air-stable class of uranyl alkoxides, 8:24080 (J:CH)
Synthesis
Synthesis and properties of uranyl monothiocarbamate alkoxides, an air-stable class of uranyl alkoxides, 8:24080 (J:CH)
URBAN AREAS
Electric-Powered Vehicles
Mission analysis of second cars to determine electric-vehicle suitability, 8:23883 (R:US)
Hybrid Electric-Powered Vehicles
Mission analysis of second cars to determine electric-vehicle suitability, 8:23883 (R:US)
URINALYSIS
See URINE
URINE
Quantitative Chemical Analysis
Epidemiologic investigation of the mercury excretion in the urine of children living in an area of industrial concentration (Western Ruhr District), 8:24410 (R:DE:In German)
US DOE
See also ANL
BATTELLE PACIFIC NORTHWEST LABORATORIES
BNL
ECONOMIC REGULATORY ADMINISTRATION
ENERGY INFORMATION ADMINISTRATION
HANFORD RESERVATION
IDAHO NATIONAL ENGINEERING LABORATORY
LARAMIE ENERGY TECHNOLOGY CENTER
LASL
LAWRENCE LIVERMORE LABORATORY
NEVADA TEST SITE
ROCKY FLATS PLANT
SAVANNAH RIVER PLANT
SOLAR ENERGY RESEARCH INSTITUTE
US DOE FIELD OFFICES
US FERC
Budgets
Quarterly status of Department of Energy projects, 8:25231 (R:US)

Congressional Inquiries
Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study, 8:23727 (R:US)
Contractor Personnel
Investigation of allegations of favored treatment of a relative of a senior official of the Department of Energy, 8:25230 (R:US)
Economic Policy
Improvements needed in the cash management practices of Interior's simultaneous oil and gas leasing program in Wyoming, 8:23724 (R:US)
Evaluation
Improvements needed in the cash management practices of Interior's simultaneous oil and gas leasing program in Wyoming, 8:23724 (R:US)
Information Dissemination
Information protection and control, 8:25283 (R:US)
Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study, 8:23727 (R:US)
Program Management
Energy conservation and the federal government: research, development, and management, 8:23707 (R:US)
Financial management in the oil-shale program, 8:23080 (R:US)
Investigation of the alleged suppression by the Office of Environment of a contracted synfuels study, 8:23727 (R:US)
Receipt and use of half-fare airline coupons at selected Department of Energy field locations, 8:25229 (R:US)
Property Management
Management of furniture at Department of Energy headquarters locations, 8:25228 (R:US)
Regulations
Investigation of allegations of favored treatment of a relative of a senior official of the Department of Energy, 8:25230 (R:US)

US DOE FIELD OFFICES
Accounting
Financial management in the oil-shale program, 8:23080 (R:US)
Program Management
Management of the ten-megawatt solar-thermal central-receiver pilot-plant project, 8:23302 (R:US)
Travel
Receipt and use of half-fare airline coupons at selected Department of Energy field locations, 8:25229 (R:US)

US ERA
See ECONOMIC REGULATORY ADMINISTRATION

US FEA
Program Management
Alleged improprieties concerning the settlement of overcharge violations against the Tauber Oil Company, 8:23043 (R:US)

US FERC
Program Management
Unrecovered costs of the headwater benefits program, 8:23742 (R:US)

US NRC
United States Nuclear Regulatory Commission-prior to 1975 was part of US AEC.
Bibliographies
Regulatory and technical reports, 8:23524 (R:US)
Legal Aspects
Regulatory licensing status summary report. Nuclear power plants data for decisions (blue book), February 1-February 28, 1983, 8:23526 (R:US)
Nuclear Facilities
Safeguards Summary Event List (SSEL), 8:23195 (R:US)
Title list of documents made publicly available, December 1-31, 1982, 8:23525 (R:US)
Nuclear Materials Management
Safeguards Summary Event List (SSEL), 8:23195 (R:US)
Standards
Review of qualification for nuclear power plant operators, 8:23537 (J:US)

US WATER POLLUTION CONTROL ACT
See CLEAN WATER ACT

USA
See also APPALACHIA
FEDERAL REGION V
The growth of energy consumption and prices in the USA, FRG, France, and the UK, 1950-1980. Final report, 8:23757 (R:US)
Air Pollution
Oxidant air pollution: estimating economic effects on US vegetation. Paper 81.2.2, 8:24306 (J:US)
Seasonal patterns of sulfate and nitrate in precipitation in the United States. Paper 81.6.1, 8:24226 (J:US)
Climates
Environmental data for sites in the National Solar Data Network, 8:23251 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23248 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23249 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23250 (R:US)
Coal Industry
Coal production: 1981, 8:23004 (R:US)
Quarterly coal report, July-September 1982, 8:23005 (R:US)
Coal Preparation
Current coal preparation research in the United States, 8:22989 (R:MX)
Electric Utilities
Electric power monthly (For July 1982), 8:23736 (R:US)
Electric power monthly (For November 1981), 8:23731 (R:US)
Electric power monthly (For April 1982), 8:23733 (R:US)
Electric power monthly (For June 1982), 8:23735 (R:US)
Electric power monthly (For May 1982), 8:23734 (R:US)
Electric power monthly (For February 1982), 8:23732 (R:US)
Energy Demand
Energy projections for the National Energy Policy Plan, 8:23716 (J:US)
Energy Expenses
Energy projections for the National Energy Policy Plan, 8:23716 (J:US)
Energy Supplies
Energy projections for the National Energy Policy Plan, 8:23716 (J:US)
Fossil-Fuel Power Plants
Cost and quality of fuels for electric utility plants (For January 1982), 8:23410 (R:US)
Cost and quality of fuels for electric utility plants (For April 1982), 8:23411 (R:US)
Cost and quality of fuels for electric utility plants (For September 1982), 8:23412 (R:US)
Fuel Supplies
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Interconnected Power Systems
US-Canadian electricity trade, 8:23740 (R:US)
Meteorology
Seasonal patterns of sulfate and nitrate in precipitation in the United States. Paper 81.6.1, 8:24226 (J:US)
Natural Gas Industry
Natural gas monthly, 8:23066 (R:US)
Nuclear Industry
Nuclear power industry, 1981, 8:23442 (R:US)
Nuclear Power Plants
Funding nuclear-power-plant decommissioning. Final report, 8:23536 (R:US)
Licensed operating reactors. Status summary report data as of October 31, 1982, 8:23523 (R:US)
Nuclear power industry, 1981, 8:23442 (R:US)
Operating reactors licensing actions summary, 8:23527 (R:US)
Regulatory licensing status summary report. Nuclear power plants data for decisions (blue book), February 1-February 28, 1983, 8:23526 (R:US)
Research Programs
Current coal preparation research in the United States, 8:22989 (R:MX)
Wind
Wind data for building ventilation in selected US cities, 8:23828 (R:US)

USSR
Radiation Accidents
Search of the Russian scientific literature for the descriptions of the medical consequences of the Kyshtym accident, 8:23188 (R:US)
UTAH
See also ROOSEVELT HOT SPRINGS
Baseline Ecology
Ecological resource research, 8:23092 (RA:US)
Cultural Resources
Cultural-economic resource research, 8:23093 (RA:US)
Hydrology
Hydrologic resource research, 8:23091 (RA:US)
Meteorology
Atmospheric resource research, 8:23090 (RA:US)
Oil Shale Deposits
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R:US)
UTERINE CERVIX CARCINOMA
See CARCINOMAS
UTILITIES
See ELECTRIC UTILITIES
PUBLIC UTILITIES

V

VACUUM PUMPS
See also CRYOPUMPS
Electronic Circuits
New vacuum systems for the 7 MEV CN accelerator of the Legnaro National Laboratory, 8:24145 (R:IT:IT)
VACUUM SYSTEMS
Design
Design and mechanical analysis of TORE SUPRA vacuum vessels and limiters, 8:25207 (J:US)
Leak Testing
Leak detection inside a vacuum vessel, 8:25208 (J:US)
Performance
Sensitivity of commercial ion gage tubes, 8:25221 (J:US)
Seals
Selection of vacuum seals for EBT-P, 8:25219 (J:US)
Surface Cleaning
Light impurity removal from stainless steel by atomic hydrogen, 8:24881 (J:NL)
VALENCE ELECTRONS
See ELECTRONS
VALVES
Fast shutter valve for TFTR neutral beam lines, 8:25128 (J:US)
VAN DE GRAAFF ACCELERATORS
Heavy Ion Accelerators
Modification of the An 400 accelerator, 8:24160 (RA:DE:In German)
VANADIUM
Electric Conductivity
Temperature dependence of electrical resistivity of vanadium, platinum and copper, 8:23978 (J:US)
VANADIUM ALLOYS
Electronic Structure
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R:US)
Hydridation
Hydrogen absorption and temperature programmed desorption (TPD) studies of iron- and chromium-substituted ZrV_2, 8:23214 (R:US)
Physical Radiation Effects
Segregation in irradiated titanium alloys (Ion irradiation (2.1 MeV Ar^+) of Ti-6Al-4V, Ti-8Al-1V-Mo, Ti-3V and Ti-8.7 Al), 8:23931 (R:US)
Superconductivity
Soft phonon modes and superconductivity in C-15 compounds, 8:23945 (R:US)
VANADIUM COMPLEXES
Liquid Column Chromatography
Fractionations of non-porphyrin complexes of vanadium and nickel from Boscan crude oil, 8:24047 (R:US)
VANADIUM HYDRIDES
Chemical Preparation
NMR study of phase transitions in VT/sub 0.50/ and VT/sub 0.75/, 8:24010 (J:US)
Phase Studies
NMR study of phase transitions in VT/sub 0.50/ and VT/sub 0.75/, 8:24010 (J:US)
VANADIUM IONS
Electron-Ion Collisions
Distorted-wave electron-impact ionization cross sections for the argon isoelectronic sequence, 8:24554 (J:US)
VANADIUM MINERALS
See MINERALS
VANADIUM OXIDES
Sorptive Properties
Hydrides of oxygen-stabilized intermetallic phases (Zr_3V_3O; Ti_4M_3O/sub x/ (M = Fe, Co, Ni)), 8:23998 (R:US)
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for the fuel-cell program, 8:23781 (R:US)
VEGETABLE OILS
Prior to March 1983 this concept was indexed to PLANTS and OILS.
Fuel Substitution
Microemulsions from vegetable oil and aqueous alcohol with 1-butanol surfactant as alternative fuel for diesel engines, 8:23239 (P:US)
VEGETATION
See PLANTS
VEHICLES
See also ELECTRIC-POWERED VEHICLES
Design
Deep-towed RUM III: a third-generation remote underwater manipulator, 8:24156 (R:US)
Energy Consumption
Residential energy consumption survey. Consumption patterns of household vehicles, supplement: January 1981-September 1981, 8:23756 (R:US)
Materials
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Radiation Monitoring
Vehicle monitors for domestic perimeter safeguards, 8:23192 (R:US)
VENTILATION
Computer Codes
Outline of a ventilation computer model for possible incorporation into DEROB, 8:23808 (RA:US)
Mathematical Models
Outline of a ventilation computer model for possible incorporation into DEROB, 8:23808 (RA:US)
Simulation
Wind-tunnel research of flowfields within naturally ventilated rooms of simple geometry, 8:23816 (R:US)
VENTILATION DUCTS
See VENTILATION
VENTILATION SYSTEMS
Air Flow
TVENT; ventilation system transient analysis (CDC7600;IBM360,370; FORTRAN IV), 8:24089 (R:US)
Transients
TVENT; ventilation system transient analysis (CDC7600;IBM360,370; FORTRAN IV), 8:24089 (R:US)
VERY HIGH FREQUENCY RADIATION
See RADIOWAVE RADIATION
VESSELS
See CONTAINERS
VESSELS (CHEMICAL REACTIONS)
See CHEMICAL REACTORS
VESSELS (PRESSURE)
See PRESSURE VESSELS

VESSELS (REACTOR)
See REACTOR VESSELS
VHF RADIATION
See RADIOWAVE RADIATION
VICKSI
Van de Graaff-Isochronous Cyclotron Combination Heavy Ion Facility at the Hahn-Meitner Institute, Berlin.
VICKSI: General remarks, 8:24180 (RA:DE:In German)
Beam Injection
Tandem-injector for VICKSI, 8:24181 (RA:DE:In German)
Data Acquisition Systems
Hardware developments, 8:25272 (RA:DE:In German)
Operation
Operation of VICKSI, 8:24161 (RA:DE:In German)
VIRGINIA
Black Shales
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Natural Gas Deposits
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
VISCOSIMETERS
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
VISITOR CENTERS
See PUBLIC BUILDINGS
VOLCANOES
Eruption
Textural analysis of tephra from a rhyodacitic eruption sequence, Thira (Santorini), Greece, 8:24490 (R:US)
Geologic Deposits
Textural analysis of tephra from a rhyodacitic eruption sequence, Thira (Santorini), Greece, 8:24490 (R:US)
VOLTAIC CELLS
See ELECTRIC BATTERIES
VOMITING
Inhibition
Peptide-induced emesis in dogs: possible relevance to radiation-induced emesis. Final report Oct 80-Sep 81, 8:24358 (R:US)

W

W. B. MC GUIRE-1 REACTOR
See MC GUIRE-1 REACTOR
W. B. MC GUIRE-2 REACTOR
See MC GUIRE-2 REACTOR
WALL LOADING
Simulation
Some factors affecting the dynamics of a plasma-wall interaction simulator, 8:24899 (J:NL)
WANKEL ENGINES
Design
Fuel saving of hot water heating plants by application of heat pumps operated with natural gas (natural gas heat pump), 8:23802 (R:DE:In German)
WASHOUT
Efficiency
Precipitation-scavenging chemistry for sulfate and nitrate from the SURE and related data. Volume 2. Final report, 8:24224 (R:US)
WASTE DISPOSAL
See also RADIOACTIVE WASTE DISPOSAL
SANITARY LANDFILLS
Public Opinion
Organizational approach to estimating public resistance at proposed disposal sites for radioactive and hazardous wastes, 8:23120 (R:US)
WASTE HEAT
Heat Recovery
Predicting the performance and cost of ORC waste-heat-recovery systems, 8:24157 (R:US)
WASTE HEAT UTILIZATION
Cost Benefit Analysis
Study on an example of heat supply from waste heat, 8:23853 (R:DE:In German)
Feasibility Studies
Fundamental study on the feasibility of waste heat utilization in households, 8:23848 (R:DE:In German)
Technology Assessment
Study on an example of heat supply from waste heat, 8:23853 (R:DE:In German)
WASTE OILS
Waste Processing
Reclamation of transformer oils containing PCBs by the Sunohio PCBX Process. Final report, 8:23038 (R:US)
WASTE PROCESSING PLANTS
See also RESOURCE RECOVERY FACILITIES
Design
Waste-water treatment apparatus, 8:24147 (TG:US)
Operation
Waste-water treatment apparatus, 8:24147 (TG:US)
WASTE PRODUCT UTILIZATION
See also WASTE HEAT UTILIZATION
Meetings
17. Lecture meeting on municipal composts and food quality, 8:24405 (R:DE:GE)
WASTE TRANSPORTATION
Containers
Design and testing of the TX-4 Type A container for packaging radioactive waste, 8:24114 (R:US)
WASTE WATER
Anaerobic Digestion
Kinetics of anaerobic decomposition of phenol, 8:22949 (R:US)
Chemical Analysis
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
Hydrologic resource research, 8:23091 (RA:US)
Mutagenicity of nonvolatile organics in undisinfected and disinfected wastewater effluents, 8:24439 (RA:US)
Mutagen Screening
Mutagenicity of nonvolatile organics in undisinfected and disinfected wastewater effluents, 8:24439 (RA:US)
Purification
Waste-water treatment apparatus, 8:24147 (TG:US)
Recycling
Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R:US)
Waste Processing
Waste-water treatment process, 8:24146 (TG:US)
Waste Processing Plants
Waste-water treatment apparatus, 8:24147 (TG:US)
Water Treatment
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R:US)
Ferromagnetic porous plastics (Japanese patent), 8:24023 (TG:US)
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
Magnetic powder for treatment of oil-polluted waste water and process for manufacturing the powder (Japanese patent), 8:23975 (TG:US)
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R:US)
Zimpro's biophysical treatment and wet-air-regeneration-system engineering study for H-COAL wastewater, 8:22951 (R:US)
WASTE-FUELED POWER PLANTS
See REFUSE-FUELED POWER PLANTS
WATER
See also DRINKING WATER
GROUND WATER
HEAVY WATER

SEAWATER
WASTE WATER
Corrosive Effects
High-temperature corrosion of ceramics. Progress report, June 15, 1981-June 14, 1982, 8:24003 (R:US)
Equilibrium
Solubility equilibria of the nitrogen oxides and oxyacids in dilute aqueous solution, 8:24247 (J:US)
Mass Transfer
Mass transfer in a bubble-agitated liquid-liquid system, 8:24139 (J:US)
Molecular Structure
Incoherent quasielastic neutron scattering from water in supercooled regime, 8:24730 (J:US)
Neutron Diffraction
Incoherent quasielastic neutron scattering from water in supercooled regime, 8:24730 (J:US)
Photochemical Reactions
Photocatalytic production of hydrogen from water by a p- and n-type polycrystalline iron oxide assembly, 8:23211 (J:US)
Photolysis
The photochemical dissociation of water by means of visible light, 8:23210 (R:US)
Purification
Automation of the mud and water circulation process at coal-preparation plant - initial study, 8:22988 (R:PL)
Recycling
Automation of the mud and water circulation process at coal-preparation plant - initial study, 8:22988 (R:PL)
WATER CHEMISTRY
Meetings
Integrated lake-watershed acidification study: proceedings of the ILWAS annual review conference (Lead abstract), 8:24280 (R:US)
WATER CONTENT
See HUMIDITY
MOISTURE
WATER COOLANT
See WATER
WATER COOLED REACTORS
See also BWR TYPE REACTORS
KUHFR REACTOR
PWR TYPE REACTORS
Fuel Elements
FUELS DATA; model verification fuel rod data (CDC CYBER176,175;CDC7600; FORTRAN IV for the auxiliary edit program, data are recorded as EBCDIC characters.), 8:23446 (R:US)
Fuel Rods
Tube crossflow force measurements, 8:23541 (R:US)
Reactor Safety
Introductory user's manual for the US Nuclear Regulatory Commission Reactor Safety Research Data Bank, 8:23628 (R:US)
WATER MODERATOR
See WATER
WATER POLLUTION
Environmental Transport
CHNSED; sediment & containment transport model (IBM360,370; FORTRAN IV (96%) and BAL (4%)), 8:24275 (R:US)
OPTRM; hydrologic transport with optimization (IBM360,370; FORTRAN IV (96%) AND BAL (4%)), 8:24276 (R:US)
WHTM; Wisconsin hydrologic transport model (IBM360,370; FORTRAN IV (96%) and Assembler (4%)), 8:24277 (R:US)
WATER POLLUTION CONTROL
1981 Winter Meeting - American Society of Agricultural Engineers, 8:23868 (J:US)
WATER PUMPS
Inspection
Raft river geothermal pump disassembly and inspection, 8:23381 (R:US)
WATER QUALITY
Health Hazards
Mortality as influenced by alteration of Pennsylvanian shale by strip mining of coal, 8:24458 (J:US)
Monitoring
Stream water quality in the coal region of Pennsylvania. General technical report, 8:22962 (R:US)
Stream water quality in the coal region of Alabama and Georgia. General technical report (final), 8:22963 (R:US)
Public Health
Variations in drinking water quality and the possible effects on human health, 8:24299 (J:US)
WATER TREATMENT
Comparative Evaluations
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
Advantages/limitations of solvent extraction, ozonation, and carbon adsorption for reduction of nonbiodegradable residuals in METC fixed-bed gasification wastewaters. Final report, 8:22925 (R:US)
Flowsheets
Activated-sludge treatment and organic characterization of oil shale retort water, 8:23088 (R:US)
Performance Testing
Zimpro's biophysical-treatment-system stress testing of the H-COAL wastewater, 8:22950 (R:US)
Process Development Units
Fossil-Energy-Program. Quarterly progress report for period ending December 31, 1982, 8:22898 (R:US)
WATER TREATMENT PLANTS
Waste Water
Mutagenicity of nonvolatile organics in undisinfected and disinfected wastewater effluents, 8:24439 (RA:US)
WATER UTILITIES
Data Acquisition Systems
Use of computers for the documentation of supply lines, 8:23430 (R:DE:In German)
WATER VAPOR
Charged-Particle Transport
Secondary electron spectra in the trace of fast ions travelling through water vapor, 8:24738 (R:DE:In German)
Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R:US)
Radiation Doses
Some analysis techniques and results of the Monte-Carlo simulation of proton and electron tracks, 8:24727 (R:US)
WATER WHEELS
Technology Assessment
Sample survey of traditional water wheels and small water turbines in nepal: a preliminary report, 8:23242 (R:US)
WATERBORNE PARTICLES
See PARTICULATES
WATERFORD-3 REACTOR
Control Rooms
Human-factors engineering control-room design review/audit: Waterford 3 SES Generating Station, Louisiana Power and Light Company, 8:23568 (R:US)
Human Factors Engineering
Human-factors engineering control-room design review/audit: Waterford 3 SES Generating Station, Louisiana Power and Light Company, 8:23568 (R:US)
Thermal Effluents
Mathematical modelling of thermal-plume interaction at Waterford Nuclear Power Station, 8:23573 (R:US)
WATERSHEDS
Acidification
Analysis of throughfall data and comparison of throughfall sampling procedures, 8:24236 (RA:US)
Geochemistry
Lysimeter and soil chemistry studies, 8:24501 (RA:US)
Geological Surveys
Distribution and characteristics of surficial geologic materials in the ILWAS watershed, 8:24282 (RA:US)
Mineralogy
Mineralogy of the ILWAS lake-watering, 8:24499 (RA:US)
Soil Chemistry
Aluminum dynamics in the ILWAS watersheds, 8:24283 (RA:US)
Lysimeter and soil chemistry studies, 8:24501 (RA:US)
WATERWHEELS
See WATER WHEELS

WAVE POWER
Bibliographies
Solar Energy Update: a current awareness journal, 8:23246 (R:US)
WAZ 16
See NICKEL BASE ALLOYS
WEAK INTERACTIONS
Flavor Model
Analysis of preon models with a small number of flavors, 8:24628 (J:US)
Unified Gauge Models
Flavor-changing electromagnetic transitions, 8:24606 (R:US)
WEAPONS
See also NUCLEAR WEAPONS
Electronic Guidance
Multiple-scattering analysis of laser-beam propagation in the atmosphere and through obscurants, 8:24726 (R:US)
WEATHERIZATION
Curriculum Guides
Do-it-yourself home energy-saving techniques. 1981-82 annual technical progress report, September 25, 1981-June 30, 1982, 8:23815 (R:US)
Education
Do-it-yourself home energy-saving techniques. 1981-82 annual technical progress report, September 25, 1981-June 30, 1982, 8:23815 (R:US)
Program Management
Weatherization program in West Virginia, 8:23812 (R:US)
WEB GROWTH METHOD
See DENDRITIC WEB GROWTH METHOD
WECS
See WIND TURBINES
WEINBERG-SALAM GAUGE MODEL
Perspectives on weak interactions, 8:24579 (RA:US)
WELDED JOINTS
Corrosion Fatigue
Assessment of corrosion fatigue behavior of offshore structures, 8:23904 (RA:US)
Fatigue of welded structural steel in sea water, 8:23905 (RA:US)
Failures
Analysis of a heat-transfer fluid fill pipe failure, 8:23914 (RA:US)
Stress Corrosion
Analysis of a heat-transfer fluid fill pipe failure, 8:23914 (RA:US)
WELDING
See also DIFFUSION WELDING
ELECTRON BEAM WELDING
Research Programs
Report of the fourth BES Welding Research Program meeting, 8:23890 (J:US)
WELDS
See WELDED JOINTS
WELL LOGGING EQUIPMENT
To be used only when the equipment itself is the topic of the paper; includes source, detector, and associated equipment.
Design
Sandia technology, 8:23882 (R:US)
Performance
Sandia technology, 8:23882 (R:US)
WELL STIMULATION
Technology Assessment
Evaluation of stimulation technologies in the Eastern Gas Shales Project (Shaped charge penetration; dendritic fracturing; tailored-pulse loading; emplaced high explosive), 8:23073 (R:US)
WENDELSTEIN-7 STELLARATOR
Neutral Beam Sources
Experience with the Wendelstein VII-neutral injectors, 8:25083 (J:US)
WEST GERMANY
See FEDERAL REPUBLIC OF GERMANY
WEST VIRGINIA
Black Shales
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
Low Income Groups
Weatherization program in West Virginia, 8:23812 (R:US)
Natural Gas Deposits
Comparative geochemistry of Devonian shale cores from the Appalachian Basin, Mason, Monongalia, and Upshur Counties, West Virginia; Illinois Basin, Tazwell County, Illinois; Clark County, Indiana; and Michigan Basin, Sanilac County, Michigan, 8:23061 (R:US)
Organic-matter content of Appalachian Devonian shales determined by use of wire-line logs: summary of work done 1976-1980, 8:23062 (R:US)
Reservoir-engineering aspects and resource-assessment methodology of Eastern Devonian gas shales, 8:23052 (R:US)
WET DEPOSITION
See WASHOUT
WETLANDS
Meetings
Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, 8:24267 (R:US)
WET-TYPE COOLING TOWERS
See COOLING TOWERS
WHALES
See CETACEANS
WHEAT
Nutrition
Increasing total and biologically active chromium in wheat grain and spinach by spraying with chromium salts, 8:24467 (J:US)
Productivity
Ozone impacts on the productivity of selected crops (Corn, wheat, soybean and peanut crops), 8:24403 (R:US)
WHOLESALE BUYERS
See RESELLERS
WHOLESALE SELLERS
See RESELLERS
WHOLESALERS
See RESELLERS
WIND
Climates
Environmental data for sites in the National Solar Data Network, 8:23249 (R:US)
Data Compilation
Environmental data for sites in the National Solar Data Network, 8:23251 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23248 (R:US)
Environmental data for sites in the National Solar Data Network, 8:23250 (R:US)
Experimental Data
Wind data for building ventilation in selected US cities, 8:23828 (R:US)
Forecasting
Learning to forecast wind at remote sites for wind-energy applications. Final report, 8:23394 (R:US)
Monitoring
Wind-resource monitoring at Southtowns Sewage Treatment Plant, Woodlawn, NY, 8:23389 (R:US)
Remote Sensing
Remote sensing for wind power potential: a prospector's handbook, 8:23388 (R:US)
WIND ENERGY CONVERSION SYSTEMS
See WIND TURBINES
WIND GENERATORS
See ELECTRIC GENERATORS
WIND TURBINES

WIND POWER
Appropriate technologies for basic energy needs in rural India. Working paper, 8:23759 (R:US)
Availability
Remote sensing for wind power potential: a prospector's handbook, 8:23388 (R:US)
Wind-resource monitoring at Southtowns Sewage Treatment Plant, Woodlawn, NY, 8:23389 (R:US)
Bibliographies
Solar Energy Update: a current awareness journal, 8:23246 (R:US)
Feasibility Studies
Renewable energy system feasibility study. Final report 2 Sep 80-30 Apr 82, 8:23252 (R:US)
Uses
Foreign applications and export potential for wind-energy systems, 8:23761 (R:US)
WIND POWER PLANTS
Commercialization
Commercialization analysis of large wind energy conversion systems. Final report, 8:23390 (R:US)
WIND TURBINES
Economic Analysis
Assessment of distributed wind-power systems, 8:23392 (R:US)
Assessment of distributed wind-power systems. Final report, 8:23391 (R:US)
Electric Batteries
Wind-energy battery-storage project. Phase I. Final report, 8:23396 (R:US)
Exports
Foreign applications and export potential for wind-energy systems, 8:23761 (R:US)
Power Generation
Assessment of load-frequency-control impacts caused by small wind turbines, 8:23393 (R:US)
WINDOWS
Airtightness
Connection between air permeability of joints of windows and exchange of air in the room, 8:23801 (R:DE:In German)
Heat Gain
Window and its heat balance considering solar radiation and additional insulation measures, 8:23799 (R:DE:In German)
Heat Losses
Window and its heat balance considering solar radiation and additional insulation measures, 8:23799 (R:DE:In German)
Insolation
Window and its heat balance considering solar radiation and additional insulation measures, 8:23799 (R:DE:In German)
Materials Testing
Bakeable optical windows for the tokamak fusion test reactor, 8:25206 (J:US)
Thermal Insulation
Window and its heat balance considering solar radiation and additional insulation measures, 8:23799 (R:DE:In German)
WOLFRAM
See TUNGSTEN
WOOD
Chemical Feedstocks
Chemical feedstocks from wood: aqueous organic alcohol treatment, 8:23263 (R:US)
Combustion
Cord wood gasification and gas combustion system, 8:23227 (J:US)
Delignification
Chemical feedstocks from wood: aqueous organic alcohol treatment, 8:23263 (R:US)
Gasification
Cord wood gasification and gas combustion system, 8:23227 (J:US)
Development of an energy converter for the production of heat, mechanical and electrical energy through the gasificaton of wood and straw in a batch gasifier with an output of 50-150 kw. extended to include the gasification of batched biomass with an output of 150-400 kw. Final report, 8:23226 (R:US)
Thermochemical conversion of biomass to synthetic fuels in a large experimental facility. Gasification Research on Wood (GROW) Project, April 1981-March 1982, 8:23270 (R:US)
Yields
User's Manual for the TVA Lumber Yield and Value File Utility Program. Version 1.0, 8:24356 (R:US)
WOOD ALCOHOL
See METHANOL
WOOD BURNING APPLIANCES
Design
Cord wood gasification and gas combustion system, 8:23227 (J:US)
WOOD FUELS
Use of this term is limited to polcy, feasibility, and socio-economic studies. For wood properties use WOOD.
Appropriate technologies for basic energy needs in rural India. Working paper, 8:23759 (R:US)
Combustion
Converting small industrial boilers to burn wood fuels. Forest Service research paper (final), 8:24153 (R:US)
WOOD WASTES
Availability
Potential of organic residues for the production of basic chemical compounds. Pt. 3, 8:23851 (R:DE:In German)
Calorific Value
Studie kring maetning av traedrester vid Nydo Energi i hissmofors (a study of measuring wood residues at nydo energy ltd.), 8:23278 (R:US)
Gasification
Energy recovery by gasification of agricultural and forestry wastes in a co-current moving bed reactor. Final report, 8:23274 (R:US)
Residues
Potential of organic residues for the production of basic chemical compounds. Pt. 2, 8:23850 (R:DE:In German)
Resource Assessment
Potential of organic residues for the production of basic chemical compounds. Pt. 1, 8:23849 (R:DE:In German)
Waste Product Utilization
Potential of organic residues for the production of basic chemical compounds. Pt. 1, 8:23849 (R:DE:In German)
Potential of organic residues for the production of basic chemical compounds, 8:23852 (R:DE:In German)
Potential of organic residues for the production of basic chemical compounds. Pt. 2, 8:23850 (R:DE:In German)
Potential of organic residues for the production of basic chemical compounds. Pt. 3, 8:23851 (R:DE:In German)
WORKERS
See PERSONNEL
WORKING (MATERIALS)
See MATERIALS WORKING
WYOMING
Oil Fields
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R:US)
Oil Shale Deposits
Naval Petroleum and Oil Shale Reserves. Annual report of operations, 8:23018 (R:US)

X

X CHROMOSOME
Prior to April 1980 this concept was indexed to HETEROCHROMOSOMES.
Chromosomal Aberrations
Characterization of x-autosome translocations, and their use as tools to investigate gene inactivation, 8:24335 (RA:US)
Investigation of the causes of genetic male sterility, 8:24336 (RA:US)
Genetic Mapping
Characterization of x-autosome translocations, and their use as tools to investigate gene inactivation, 8:24335 (RA:US)

X-CHROMOSOMES
See X CHROMOSOME
XENON
Inventories
Byproduct inventories, 8:23171 (R:US)
Ion-Atom Collisions
Impact-parameter dependence of M-shell excitation in slow Xe + Xe collisions, 8:24535 (RA:DE:In German)
Isotope Ratio
Potential for large-scale uses for fission-product Xenon, 8:23105 (R:US)
Photoionization
Resonance ionization spectroscopy schemes for Ar, Kr and Xe, 8:24559 (J:NL)
Recovery
Technology for recovery of byproducts, 8:23173 (R:US)
Uses
Potential for large-scale uses for fission-product Xenon, 8:23105 (R:US)
XENON 123
E2-Transitions
Lifetime measurements and quadrupole moments in sup(123,125)Xe, 8:24676 (RA:DE:In German)
XENON 125
E2-Transitions
Lifetime measurements and quadrupole moments in sup(123,125)Xe, 8:24676 (RA:DE:In German)
XENON 132 REACTIONS
Deep Inelastic Heavy Ion Reactions
No need for a new damping mechanism in the system ^{132}Xe + ^{56}Fe at energies below 7.12 MeV/ν, 8:24673 (RA:DE:In German, English)
XENON IONS
Ion-Atom Collisions
Impact-parameter dependence of M-shell excitation in slow Xe + Xe collisions, 8:24535 (RA:DE:In German)
X-RASERS
See X-RAY LASERS
X-RAY DIFFRACTION
Automation
Further development of automatic measuring equipment for X-ray mineral analysis with computer, 8:24496 (R:DE:In German)
X-RAY EMISSION ANALYSIS
See also X-RAY FLUORESCENCE ANALYSIS
Argon 40 Beams
Detection of trace elements with heavy ions, 8:24048 (RA:DE:In German)
Corrections
Influence of detector geometry on AEM-based x-ray microanalysis. I. Theoretical, 8:24046 (R:US)
Geometry
Influence of detector geometry on AEM-based x-ray microanalysis. I. Theoretical, 8:24046 (R:US)
X-RAY EQUIPMENT
See also X-RAY SOURCES
Design
Facility for radiographic diagnosis, 8:24346 (P:DE:In German)
X-RAY FLUORESCENCE ANALYSIS
Performance Testing
X-ray fluorescence/X-ray energy analysis as a trace element tool, 8:24324 (J:US)
X-RAY LASERS
Energy and technology review, 8:24842 (R:US)
Laser-heated flashlamps: a step toward a soft x-ray laser, 8:24132 (RA:US)
X-RAY SOURCES
For cosmic sources of x radiation use COSMIC X-RAY SOURCES.
Feasibility Studies
Electron-channeling radiation: x-ray source feasibility study, 8:24729 (R:US)
Kilo Amp Beam Currents
Recent performance improvements on FXR, 8:24189 (R:US)
Linear Accelerators
Multistage pulsed-power electron accelerators, 8:24185 (R:US)
Recent performance improvements on FXR, 8:24189 (R:US)
X-RAY SPECTROMETERS
Energy and technology review, 8:24842 (R:US)
Design
Laser fusion x-ray measurements, 8:24843 (RA:US)

Y

YANG-MILLS THEORY
Lorentz Invariance
Lorentz-non-invariant counter-terms in QCD in a general axial gauge, 8:24636 (J:NL)
YEASTS
Cultivation Techniques
Organisms and compounds of unnatural isotopic composition in NMR, 8:24348 (R:US)
Messenger-RNA
mRNA processing in yeast, 8:24312 (RA:US)
YIELD (BIOLOGICAL)
See PRODUCTIVITY
YTTRIUM
Atom Transport
Studies of the diffusion of hydrogen in yttrium, 8:23990 (TJ:US)
Sorptive Properties
Diffusion of hydrogen in yttrium, 8:23553 (TJ:US)
YTTRIUM ALUMINIUM GARNETS
See ALUMINIUM OXIDES
YTTRIUM BORIDES
Magnetic Specific Heat
Magnetic correlations in $ErRh_4B_4$, 8:24015 (BA:US)
Spin-Lattice Relaxation
^{11}B study of spin dynamics in Y/sub 1-x/RE/sub x/Rh_4B_4 (RE = Gd, Er), 8:23999 (R:US)

Z

Z PINCH DEVICES (LINEAR)
See LINEAR Z PINCH DEVICES
ZEA MAYS
See MAIZE
ZEOLITES
See also MORDENITE
Absorption
Optimization of adsorbate-absorbent couples. Final report, 8:23321 (R:XE:FR)
Adsorption
Optimization of adsorbate-absorbent couples. Final report, 8:23321 (R:XE:FR)
Sorptive Properties
Iodine-fixation studies at the Pacific Northwest Laboratory, 8:23165 (R:US)
Structural Chemical Analysis
Transmission and backscatter Moessbauer spectroscopy of zeolite Fe (and Fe-Co) synfuel catalysts, 8:24057 (R:US)
ZERO POWER REACTORS
See also ZPR-9 REACTOR
Data Compilation
Nuclear reactors built, being built, or planned in the Unites States as of June 30, 1981, 8:23443 (R:US)
ZINC
Biological Effects
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Crystallography
Measure of the electron drag and the phonon drag in zinc crystals, 8:23985 (J:US)
Ecological Concentration
Accumulation of cadmium and zinc in soil and vegetation from long-term application of wastewater, 8:24475 (J:US)

Environmental pollution control at the AMAX-Homestake lead smelter, 8:24245 (J:US)
Heavy metals in the environs of a smelter, 8:24292 (J:US)
Metabolism
Effect of phosphorus and calcium on zinc metabolism in man, 8:24461 (J:US)
Effect of starvation on ^{65}Zn tissue distribution and excretion by rats, 8:24464 (J:US)
Relationship between gastric cancer and blood trace metal levels, 8:24460 (J:US)
Zinc and magnesium concentrations in plasma and red blood cells in patients on digitalis medication, 8:24462 (J:US)
Production
Energy requirements for materials used in vehicles characterized for the TAPCUT project, 8:23842 (R:US)
Toxicity
Enzyme and gene regulation in Drosophila, 8:24412 (RA:US)
Molecular mechanisms of toxicity, mutagenesis and carcinogenesis by metal pollutants, 8:24414 (RA:US)
Uptake
Release of zinc from disposable coils during hemodialysis, 8:24345 (J:US)

ZINC 65
Tracer Techniques
Effect of starvation on ^{65}Zn tissue distribution and excretion by rats, 8:24464 (J:US)

ZINC ALLOYS
See also BRASS
Fractures
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)
Intergranular Corrosion
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)
Stress Corrosion
Intergranular stress corrosion cracking of aluminum alloys by hydrogen or by liquid metal embrittlement, 8:23909 (RA:US)

ZINC OXIDES
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Electrochemistry
Microwave absorption studies of interface phenomena at ZnO electrodes, 8:24074 (J:US)
Photochemistry
Microwave absorption studies of interface phenomena at ZnO electrodes, 8:24074 (J:US)
Sorptive Properties
Studies involving high-temperature desulfurization/regeneration reactions of metal oxides for fuel-cell program, 8:23782 (R:US)

ZIRCALOY
For unspecified Zircaloy alloys.
See also ZIRCALOY 2
ZIRCALOY 4
Stress Corrosion
Pellet-clad interaction failures: stress corrosion cracking by iodine or metal vapour embrittlement by cesium/cadmium vapours, 8:23920 (RA:US)
Thermodynamic assessment of in-reactor iodine SCC of zircaloy, 8:23982 (J:NL)

ZIRCALOY 2
Chemical Composition
Oxidation-induced dimensional changes in zircaloy cladding tubes, 8:23921 (RA:US)
Oxidation
Oxidation-induced dimensional changes in zircaloy cladding tubes, 8:23921 (RA:US)

ZIRCALOY 4
Chemical Composition
Oxidation-induced dimensional changes in zircaloy cladding tubes, 8:23921 (RA:US)
Deformation
Boundary effects on Zircaloy-4 cladding deformation in LOCA simulation tests, 8:23651 (J:US)
Oxidation
Oxidation-induced dimensional changes in zircaloy cladding tubes, 8:23921 (RA:US)
Physical Radiation Effects
EPRI/B and W cooperative program on PWR fuel-rod performance. Final report, 8:23498 (R:US)

ZIRCONIUM 82
Gamma Cascades
Gamma ray spectroscopy in ^{78}Sr and ^{82}Zr, 8:24669 (RA:DE:In German)

ZIRCONIUM 90 TARGET
Krypton 86 Reactions
Role of deformation and shell effects in deep inelastic collisions of ^{86}Kr + ^{88}Sr,^{90}Zr,^{92}Mo at energies close to the Coulomb barrier, 8:24667 (RA:DE:In German, English)

ZIRCONIUM ALLOYS
Hydridation
Hydrogen absorption and temperature programmed desorption (TPD) studies of iron- and chromium-substituted ZrV_2, 8:23214 (R:US)
Physical Radiation Effects
Radiation damage in amorphous CuZr-alloys, 8:23965 (RA:DE:In German)

ZIRCONIUM HYDRIDES
Interstitials
Interstitial site occupation in ZrNiH, 8:23997 (R:US)

ZIRCONIUM OXIDES
Catalytic Effects
Development of new catalysts for coal liquids refining. Seventh quarterly report, 1 July 1980 - 30 September 1980, 8:22921 (R:US)
Density
Densification of monoclinic ZrO_2 with vanadate additives. Final report 1 Mar 79-1 Mar 82, 8:23991 (R:US)
Grain Boundaries
Densification of monoclinic ZrO_2 with vanadate additives. Final report 1 Mar 79-1 Mar 82, 8:23991 (R:US)
Sintering
Densification of monoclinic ZrO_2 with vanadate additives. Final report 1 Mar 79-1 Mar 82, 8:23991 (R:US)
Sorptive Properties
Hydrides of oxygen-stabilized intermetallic phases (Zr_3V_3O; Ti_4M_3O/sub x/ (M = Fe, Co, Ni)), 8:23998 (R:US)

ZOOPLANKTON
Metabolism
Origins of dissolved organic matter in Southern California coastal waters: experiments on the role of zooplankton, 8:24272 (J:DE)

ZPR-9 REACTOR
Uncooled.
Reactivity Worths
Flux distortion effects in the diagnostic cores phase 1 assembly, 8:23578 (J:US)

CONTRACT NUMBER INDEX

Numbers assigned to DOE contracts under which documents announced in this publication were prepared are included in this index.

Contract No.	Abstract No.	Report No.
AA07-76RL02426	Montana Bureau of Mines and Geology, Butte	
	8:23363	Montana Geological Society, Annual Field Conference, Guidebook 357-363 (1981).
AC01-76CS32388	International Business Machines Corp., Huntsville, AL (USA)	
	8:23341	SOLAR/2011—79/14
AC01-76ET10204	Combustion Engineering, Inc., Windsor, CT (USA)	
	8:22931	EPRI-AP—2846
AC01-76EV03161	Radiation Effects Research Foundation, Hiroshima (Japan)	
	8:24357	ABCC-TR—33-71
AC01-77CS34049	International Business Machines Corp., Huntsville, AL (USA). Federal Systems Div.	
	8:23248	SOLAR/0010—79/06
	International Business Machines Corp., Huntsville, AL (USA)	
	8:23249	SOLAR/0010—79/08
	8:23250	SOLAR/0010—79/10
	International Business Machines Corp., Huntsville, AL (USA). Federal Systems Div.	
	8:23251	SOLAR/0010—79/11
	International Business Machines Corp., Huntsville, AL (USA)	
	8:23328	SOLAR/0023—79/40
	8:23329	SOLAR/0025—79/42
	International Business Machines Corp., Gaithersburg, MD (USA)	
	8:23330	SOLAR/1002—79/14
	8:23331	SOLAR/1013—79/14
	International Business Machines Corp., Huntsville, AL (USA)	
	8:23332	SOLAR/1015—79/14
	International Business Machines Corp., Gaithersburg, MD (USA)	
	8:23333	SOLAR/1034—79/14
	International Business Machines Corp., Huntsville, AL (USA)	
	8:23334	SOLAR/1043—79/14
	International Business Machines Corp., Gaithersburg, MD (USA)	
	8:23335	SOLAR/1045—79/14
	International Business Machines Corp., Huntsville, AL (USA)	
	8:23337	SOLAR/1051—79/14
	International Business Machines Corp., Gaithersburg, MD (USA)	
	8:23338	SOLAR/1087—79/14
	International Business Machines Corp., Huntsville, AL (USA)	
	8:23339	SOLAR/2003—79/14
	8:23340	SOLAR/2009—79/14
	8:23342	SOLAR/2014—79/14
	Science Applications, Inc., Huntsville, AL (USA)	
	8:23343	SOLAR/2018—79/14
	International Business Machines Corp., Huntsville, AL (USA)	
	8:23344	SOLAR/2021—79/14
	8:23345	SOLAR/2036—79/14
	8:23346	SOLAR/2041—79/14
	8:23348	SOLAR/2048—79/14
AC01-78CS20101	Reutter (John G.) Associates, Camden, NJ (USA)	
	8:23874	DOE/CS/20101—1
AC01-78CS20451	Systems Technology Corp., Xenia, OH (USA)	
	8:23876	DOE/CS/20451—T1
AC01-78ET10159	UOP/SDC, Joint Venture, McLean, VA (USA)	
	8:22920	DOE/ET/10159—T24
AC01-78ET11056	Polytechnic Inst. of New York, Farmingdale (USA)	
	8:23775	DOE/ET/11056—T7
AC01-79CS30127	Florida Solar Energy Center, Cape Canaveral (USA)	
	8:23319	DOE/CS/30127—T1
AC01-79EI10565	ICF, Inc., Washington, DC (USA)	
	8:23031	DOE/EI/10565—T1
AC01-79EI10568	ICF, Inc., Washington, DC (USA)	
	8:23711	DOE/EI/10568—T1
AC01-79ET14236	Lee-Norse Co., Belle Vernon, PA (USA)	
	8:22974	DOE/ET/14236—1
	8:22975	DOE/ET/14236—2
AC01-79PE70044	Hittman Associates, Inc., Columbia, MD (USA)	
	8:23813	DOE/PE/70044—T6
AC01-79PE70078	RAND Corp., Santa Monica, CA (USA)	
	8:23750	RAND/N—1709-DOE
AC01-80CS64007	Unified Industries, Inc., Springfield, VA (USA)	
	8:23706	DOE/CS/64007—T2
	8:23809	DOE/CS/64007—T1
	8:23810	DOE/CS/64007—T3
	8:23811	DOE/CS/64007—T4
AC01-80EI10231	USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels	
	8:23758	DOE/EIA—0360(81)
AC01-80EI10696	Policy Planning and Evaluation, Inc., McLean, VA (USA)	
	8:23687	DOE/EI/10696—1-Vol.1
	8:23688	DOE/EI/10696—1-Vol.2
	8:23689	DOE/EI/10696—1-Vol.3-Pt.2
	8:23712	DOE/EI/10696—1-Vol.3-Pt.1
AC01-81EI11865	One America, Inc., Washington, DC	
	8:25269	DOE/EI/11865—T1-Vol.1
	8:25270	DOE/EI/11865—T1-Vol.4
	8:25271	DOE/EI/11865—T1-Vol.5
	8:25287	DOE/EI/11865—T1-Vol.3-App.E
	8:25288	DOE/EI/11865—T1-Vol.2-A-D
AC01-82EP12079	GCA Corp., Bedford, MA (USA). GCA Technology Div.	
	8:24302	DOE/EP/12079—T3
AC01-82FE60138	Pyros, Inc., Gaithersburg, MD (USA)	
	8:23035	DOE/FE/60138—T2
AC02-76CH00016	Brookhaven National Lab., Upton, NY (USA)	
	8:23118	BNL—51612
	8:23432	BNL—32503
	8:23634	NUREG/CR—3074
	8:23667	BNL—32591
	8:24027	BNL—32589
	8:24028	BNL—32590

Contract No.	Abstract No.	Report No.
	8:24144	BNL—31913
	8:24195	BNL—32603
	8:24247	Advances in Environmental Science and Engineering 4 vp (1981).
	8:24266	BNL—51634
	8:24574	
AC02-76CH03000	Fermi National Accelerator Lab., Batavia, IL (USA)	
	8:24194	FERMILAB-PUB—82/92
AC02-76CH03073	Princeton Univ., NJ (USA). Plasma Physics Lab.	
	8:24765	PPPL—1772
	8:24766	PPPL—1977
	8:24767	PPPL—1980
	8:24768	PPPL—1982
	8:24769	PPPL—1983
	Johns Hopkins Univ., Baltimore, MD (USA). Dept. of Physics	
	8:24770	PPPL—1985
	Princeton Univ., NJ (USA). Plasma Physics Lab.	
	8:24771	PPPL—1986
	8:24772	PPPL—1989
	8:24779	Physics of Fluids 26 NO. 3. 673-677 (Mar 1983).
	8:24787	Physics of Fluids 26 NO. 3. 795-796 (Mar 1983).
AC02-76ER01198	Illinois Univ., Urbana (USA)	
	8:24032	DOE/ER/01198—1363
AC02-76ER02640	Minnesota Univ., Minneapolis (USA)	
	8:24522	DOE/ER/02640—14
AC02-76ER03069	Massachusetts Inst. of Tech., Cambridge (USA). Lab. for Nuclear Science	
	8:24576	DOE/ER/03069—T3
AC02-76ER03071	Los Alamos National Lab., NM (USA)	
	8:24584	LA—8775-C(Mar 1981).
AC02-76ER03075	Los Alamos National Lab., NM (USA)	
	8:24593	LA—8775-C(Mar 1981).
AC02-76ER03077	New York Univ., NY	
	8:24564	International Journal of Quantum Chemistry 20 1107-1119 (1981).
AC02-76ER03238	Carnegie-Mellon Univ., Pittsburgh, PA (USA)	
	8:24076	DOE/ER/03238—T1
AC02-76ER04178	Massachusetts Inst. of Tech., Cambridge (USA)	
	8:23264	DOE/ER/04178—6
AC02-76ET20279	Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.	
	8:23265	DOE/ET/20279—156
	8:23291	DOE/ET/20279—236
	8:23662	DOE/ET/20279—157
AC02-76ET34203	General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.	
	8:23447	DOE/ET/34203—47
AC02-76ET53051	Wisconsin Univ., Madison (USA)	
	8:24761	DOE/ET/53051—49
AC02-76EV01300	Wisconsin Univ., Madison (USA)	
	8:24328	DOE/EV/01300—T1
AC02-76EV02423	Harvard Univ., Cambridge, MA (USA). Biological Labs.	
	8:24325	DOE/EV/02423—T1
AC02-76EV02828	Michigan Univ., Ann Arbor (USA)	
	8:24366	DOE/EV/02828—T1
AC02-76EV02965	Johns Hopkins Univ., Baltimore, MD (USA). Dept. of Biology	
	8:24408	DOE/EV/02965—2
AC02-76EV03292	Johns Hopkins Univ., Shady Side, MD (USA). Chesapeake Bay Inst.	
	8:24278	DOE/EV/03292—3
AC02-76EV03425	Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Garmisch-Partenkirchen (Germany, F.R.). Inst. fuer Atmosphaerische Umweltforschung	
	8:24232	DOE/ET/03425—19
AC02-77CH00178	Xerox Palo Alto Research Center, CA (USA)	
	8:23280	SERI/PR—9079-1-T6
	Solar Energy Research Inst., Golden, CO (USA)	
	8:23281	SERI/TR—215-1598
	8:23326	SERI/TP—254-1492
	Planning Research Corp., McLean, VA (USA)	
	8:23761	SERI/STR—211-1827
	8:23762	
	Solar Energy Research Inst., Golden, CO (USA)	
	8:23827	SERI/TP—254-1801
	8:23828	SERI/TP—254-1802
AC02-77ER04461	Massachusetts Inst. of Tech., Cambridge (USA)	
	8:23950	DOE/ER/04461—3
AC02-77EV04326	New York Univ., NY (USA). Inst. of Environmental Medicine	
	8:24197	DOE/EV/04326—4
AC02-78ER04972	Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Earth and Planetary Sciences	
	8:23096	DOE/ER/04972—4
AC02-78ER05002	Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Materials Science and Engineering	
	8:23951	DOE/ER/05002—32
AC02-78ET21002	VSE Corp., Alexandria, VA (USA)	
	8:23308	DOE/ET/21002—T25
AC02-78ET34212	Babcock and Wilcox Co., Lynchburg, VA (USA)	
	8:23473	DOE/ET/34212—36
	8:23476	DOE/NE/34087—T1-Vol.1(1982).
	8:23492	DOE/NE/34087—T1-Vol.2(1982).
AC02-78ET34213	Babcock and Wilcox Co., Lynchburg, VA	
	8:23488	DOE/NE/34087—T1-Vol.2(1982).
AC02-78ET52048	Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering	
	8:24827	DOE/ET/52048—19
AC02-79ER10394	Pennsylvania State Univ., University Park (USA). Dept. of Mechanical Engineering	
	8:24104	CONF-820901—9
	8:24105	DOE/ER/10394—2
AC02-79ER10421	Utah Univ., Salt Lake City (USA). Dept. of Materials Science and Engineering	
	8:24022	DOE/ER/10421—4
AC02-79ER10450	Univ. of Minnesota, MN	
	8:23929	CONF-810913—Vol.1(1981).
	8:23930	CONF-810913—Vol.1(1981).
AC02-79ET10815	Tennessee Univ., Tullahoma (USA). Space Inst.	
	8:23773	DOE/ET/10815—58
	8:23774	DOE/ET/10815—61
AC02-79ET29071	General Electric Co., Pittsfield, MA (USA). Power Transformer Dept.	
	8:23433	DOE/ET/29071—T4
AC02-79ET34010	C-E Power Systems, Windsor, CT (USA)	
	8:23471	DOE/ET/34010—7
	8:23472	DOE/ET/34010—8
AC02-80CS30254	Texas Univ., Austin (USA). School of Architecture	
	8:23804	DOE/CS/30254—5
AC02-80CS40312	Lowell Univ., MA (USA)	
	8:23859	DOE/CS/40312—2
AC02-80ER10613	Columbia Univ., New York (USA). Plasma Physics Lab.	
	8:24760	DOE/ER/10613—2
AC02-80ER10645	Wisconsin Univ., Madison (USA). Dept. of Chemical Engineering	
	8:23029	DOE/ER/10645—8
	Imperial Chemical Industries Ltd., Billingham (UK)	
	8:23860	DOE/ER/10645—10-Pt.2

Contract No.	Abstract No.	Report No.
		Wisconsin Univ., Madison (USA). Dept. of Chemical Engineering
	8:24106	DOE/ER/10645—10-Pt.1
AC02-80ER10646		**Chicago Univ., IL (USA)**
	8:24158	DOE/ER/10640—3
AC02-80ER10677		**Kansas State Univ., Manhattan (USA)**
	8:24082	DOE/ER/10677—5
AC02-80ER10722		**Colorado Univ., Boulder (USA). Dept. of Chemistry**
	8:24527	DOE/RA/10722—3
AC02-80EV10467		**Wisconsin Univ., Madison (USA)**
	8:24279	DOE/EV/10467—T1
AC02-81CS22804		**Lane and Edson, P.C., Washington, DC (USA)**
	8:23705	DOE/CS/22804—T6
AC02-81ER10907		**Dartmouth Coll., Hanover, NH (USA). Thayer School of Engineering**
	8:23952	DOE/ER/10907—2
AC02-81ER10915		**Pittsburgh Univ., PA (USA). Dept. of Metallurgical and Materials Engineering**
	8:24003	DOE/ER/10915—2
AC02-81ER10921		**Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Geology**
	8:24498	DOE/ER/10921—T1
AC02-81ER40017		**Harvard Univ., Cambridge, MA (USA)**
	8:24176	DOE/ER/40017—4
AC02-81ER40033		**Rockefeller Univ., New York (USA)**
	8:24196	DOE/ER/40033—9
		Rockefeller Univ., New York (USA). Dept. of Experimental Physics
	8:24577	DOE/ER/40033—8
AC02-81EV10731		**Harvard Univ., Cambridge, MA (USA). Energy and Environmental Policy Center**
	8:24407	DOE/ER/10731—2
	8:24409	DOE/EV/10731—T1
AC02-81NE34087		**American Nuclear Society, Lynchburg, VA. Virginia Section**
	8:23448	DOE/NE/34087—T1-Vol.1
	8:23458	DOE/NE/34087—T1-Vol.2
AC02-82CE40583		**Rasor Associates, Inc., Sunnyvale, CA (USA)**
	8:23858	DOE/CE/40583—T1
AC02-82ER12015		**Martin Marietta Labs., Baltimore, MD (USA)**
	8:24340	DOE/ER/12015—4
AC03-76CS32393		**Ahern-MacVittie-Hofmann and Goodwin Architects Ltd., Tempe, AZ (USA)**
	8:23320	DOE/CS/32393—T1
AC03-76ER00511		**Los Alamos National Lab., NM (USA)**
	8:24582	LA—8775-C(Mar 1981).
AC03-76ET53057		**Science Applications, Inc., Boulder, CO (USA). Plasma Research Inst.**
	8:24774	SAI—254-83-386-LJ
AC03-76SF00098		**Lawrence Berkeley Lab., CA (USA)**
	8:23148	LBL—15052
	8:23211	Journal of Physical Chemistry 86 NO. 23. 4484-4485 (11 Nov 1982).
	8:23282	Science (Washington, D.C.) 219 24-26 (7 Jan 1983).
	8:23679	LBL—15546
	8:23818	LBL—14251
	8:23819	LBL—15199
	8:23970	LBL—13588
	8:23971	LBL—14748
	8:24069	LBL—15485
AC03-76SF00515		**Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305**
	8:24602	Physical Review [Section] D: Particles and Fields 27 NO. 1. 285-288 (1 Jan 1983).
	8:24624	Physical Review [Section] D: Particles and Fields 27 NO. 1. 98-104 (1 Jan 1983).
	8:24625	Physical Review [Section] D: Particles and Fields 27 NO. 1. 105-111 (1 Jan 1983).
	8:24629	Physical Review [Section] D: Particles and Fields 27 NO. 1. 311-312 (1 Jan 1983).
AC03-76SF01012		**Univ. of California, San Francisco**
	8:24476	Mutation Research 91 255-258 (1981).
AC03-76SF01240		**Engelhard Minerals and Chemicals Corp., Edison, NJ (USA). Research and Development Dept.**
	8:23790	DOE/SF/01240—T1
AC03-76SF11109		**Honeywell, Inc., Minneapolis, MN (USA). Systems and Research Center**
	8:23303	DOE/SF/11109—T15
AC03-79ET23119		**Decision Focus, Inc., Palo Alto, CA (USA)**
	8:23390	DOE/ET/23119—T1
AC03-80SF11510		**Colorado State Univ., Fort Collins (USA). Fluid Dynamics and Diffusion Lab.**
	8:23816	DOE/SF/11510—T1
AC04-76DP00053		**Monsanto Research Corp., Miamisburg, OH (USA). Mound**
	8:24019	MLM—3039
	8:24050	MLM—3047
AC04-76DP00487		**Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)**
	8:24213	MHSMP—83-09
	8:24214	MHSMP—83-10
AC04-76DP00613		
	8:24025	
		Bendix Corp., Kansas City, MO (USA)
	8:24101	BDX—613-2912
	8:25265	BDX—613-2829
AC04-76DP00789		**Sandia National Labs., Albuquerque, NM (USA)**
	8:22936	SAND—82-2495
	8:23060	SAND—83-0287
	8:23077	SAND—83-0083
	8:23082	SAND—82-2699
	8:23117	SAND—82-2681
		Sandia National Labs., Livermore, CA (USA)
	8:23253	SAND—83-8202
		Boeing Computer Services Co., Seattle, WA (USA)
	8:23293	SAND—81-7088/14
	8:23294	SAND—81-7088/15
	8:23295	SAND—81-7088/16
		McDonnell Douglas Astronautics Co., Huntington Beach, CA (USA)
	8:23305	MDC-H—0141
		Sandia National Labs., Livermore, CA (USA)
	8:23307	SAND—82-8057
		Sandia National Labs., Albuquerque, NM (USA)
	8:23382	SAND—82-0899C
	8:23383	SAND—82-7203
	8:23396	SAND—82-7211
	8:23505	NUREG/CR—3009
	8:23550	NUREG/CR—3063
		Massachusetts Inst. of Tech., Cambridge (USA)
	8:23574	NUREG/CR—2925
		Sandia National Labs., Albuquerque, NM (USA)
	8:23610	EPRI-NP—2745
	8:23627	NUREG/CR—1391
	8:23629	NUREG/CR—2728
		General Physics Corp., Columbia, MD (USA)
	8:23630	NUREG/CR—2744/1
		Sandia National Labs., Albuquerque, NM (USA)
	8:23632	NUREG/CR—2887
	8:23633	NUREG/CR—2901
	8:23682	SAND—82-0695
	8:23882	SAND—82-2227-Vol.7-No.1
	8:24007	SAND—82-2469
	8:24035	Journal of Applied Physics 54 NO. 3. 1457-1460 (Mar 1983).
	8:24111	SAND—79-2291
	8:24112	SAND—81-1295

Contract No.	Abstract No.	Report No.
	8:24113	SAND—82-0852
	Sandia National Labs., Livermore, CA (USA)	
	8:24137	SAND—83-8209
	Sandia National Labs., Albuquerque, NM (USA)	
	8:24169	SAND—83-0558C
	8:24185	SAND—82-2453C
	8:24186	SAND—83-0514C
	8:24187	SAND—83-0628C
	8:24188	SAND—83-0649C
	Sandia National Labs., Livermore, CA (USA)	
	8:24242	SAND—82-8894
	Sandia National Labs., Albuquerque, NM (USA)	
	8:24493	SAND—82-2373
	8:24500	SAND—83-0474c
	8:24729	SAND—82-1821
	8:24775	SAND—82-1269C
	8:24797	Journal of Nuclear Materials 111 598-605 (Nov-Dec 1982).
	8:24798	Journal of Nuclear Materials 111 628-635 (Nov-Dec 1982).
	8:24902	Journal of Nuclear Materials 111 819-826 (Nov-Dec 1982).
	8:24910	Journal of Nuclear Materials 111 866-867 (Nov-Dec 1982).
	New Mexico Univ., Albuquerque (USA). Dept. of Electrical Engineering and Computer Science	
	8:25276	SAND—82-2975C
	Sandia National Labs., Albuquerque, NM (USA)	
	8:25277	SAND—83-0041
	8:25278	SAND—83-0132
AC04-76DP03533	**Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant**	
	8:23395	RFP—3032/1
	8:23975	RFP-Trans—379(Mar 1983).
	8:24023	RFP-Trans—383(Feb 1983).
	8:24053	RFP-Trans—391(Feb 1983).
	8:24054	RFP-Trans—378(Feb 1983).
	8:24070	RFP-Trans—394(Mar 1983).
	8:24130	
	8:24146	
	8:24147	RFP-Trans—382(Feb 1983).
AC04-76EV01013	**Inhalation Toxicology Research Inst., Albuquerque, NM**	
	8:24456	Fundamental and Applied Toxicology 2 NO. 7-8. 153-157 (1982).
AC04-78CS35365	**Okayama Univ. (Japan). Dept. of Industrial and Mechanical Engineering**	
	8:23350	ALO—5365-4
AC04-83AL22028	**Teledyne Energy Systems, Timonium, MD (USA)**	
	8:23201	DOE/AL/22028—T1
AC05-76ET10143	**Ashland Synthetic Fuels, Inc., KY (USA)**	
	8:22950	DOE/ET/10143—T35
	8:22951	DOE/ET/10143—T36
AC05-76OR00033	**Oak Ridge Associated Universities, Inc., TN (USA)**	
	8:23637	ORAU/IEA—83-2(M)
	8:24404	CONF-820655—13
AC06-76FF02170	**Hanford Engineering Development Lab., Richland, WA (USA)**	
	8:23519	HEDL-TME—73-51
	8:23617	HEDL-SA—2854
	8:23955	HEDL-SA—2687-FP
	8:24830	HEDL-SA—2700
	8:24831	HEDL-TME—82-28
AC06-76RL01830	**Pacific Northwest Lab., Richland, WA (USA)**	
	8:23105	PNL-SA—11163
	Department of Energy, Richland, WA (USA). Richland Operations Office	
	8:23114	DOE/RL—83-1

Contract No.	Abstract No.	Report No.
	Pacific Northwest Lab., Richland, WA (USA)	
	8:23152	NUREG/CR—3030
	Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation	
	8:23156	ONWI—9(82-2)
	Pacific Northwest Lab., Richland, WA (USA)	
	8:23158	PNL—3000-8
	8:23159	PNL—3172
	8:23160	PNL—4423
	8:23161	PNL—4436
	8:23162	PNL—4625
	8:23163	PNL—4637
	8:23164	PNL-SA—9637
	8:23165	PNL-SA—9829
	8:23166	PNL-SA—10777
	8:23167	PNL-SA—10780
	8:23168	PNL-SA—10800
	8:23169	PNL-SA—10829
	8:23170	PNL-SA—10832
	8:23171	PNL-SA—11144
	8:23172	PNL-SA—11174
	8:23173	PNL-SA—11179
	Vanderbilt Univ., Nashville, TN (USA). Dept. of Environmental and Water Resources Engineering	
	8:23188	ONWI—424
	Missouri Univ., Rolla (USA)	
	8:23270	DOE/NBM—1059
	Pacific Northwest Lab., Richland, WA (USA)	
	8:23279	PNL-SA—10933
	Corps of Engineers, Tulsa, OK (USA)	
	8:23306	PNL—4396
	Pacific Northwest Lab., Richland, WA (USA)	
	8:23394	PNL—4318
	8:23549	NUREG/CR—2716-Vol.3
	8:23659	PNL—4460
	8:23660	PNL—4639
	FluiDyne Engineering Corp., Minneapolis, MN (USA)	
	8:23666	PNL—4390
	Battelle Pacific Northwest Labs., Richland, WA (USA)	
	8:23717	DOE/RL/01830—T9
	8:23898	CONF-810913—Vol.1(1981).
	Pacific Northwest Lab., Richland, WA (USA)	
	8:24052	PNL-SA—11151
	8:24110	PNL-SA—9530-Pt.1
	8:24142	PNL-SA—9511
	8:24270	PNL—4527
	8:24271	PNL-SA—8775
	8:24291	PNL-SA—11182
	Texas A and M Univ., College Station (USA). Dept. of Rural Sociology	
	8:24303	ONWI—266
	Pacific Northwest Lab., Richland, WA (USA)	
	8:24365	DOE/EP—0040/1
	8:24391	PNL-SA—10964
	8:24395	International Journal of Biological Research in Pregnancy 2 NO. 4. 159-167 (1981).
AC06-77RL01030	**Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations**	
	8:23174	RHO-BW-SA—219-P
	8:23175	RHO-BW-ST—46P
AC06-79ET34026	**Exxon Nuclear Co., Inc., Richland, WA (USA)**	
	8:23106	DOE/ET/34026—6
AC07-76ID01570	**EG and G Idaho, Inc., Idaho Falls (USA)**	
	8:22930	EGG-FM—6187
	8:23122	DOE/LLW—19T
	8:23123	EGG—2236
	8:23124	EGG-FM—6153
	8:23381	EGG-GTH—6143

Contract No.	Abstract No.	Report No.
	Idaho National Engineering Lab., Idaho Falls (USA)	
	8:23495	EGG-FM—5487
	8:23496	EGG-TMI—6181
	Bechtel Northern Corp., Gaithersburg, MD (USA)	
	8:23504	GEND—030-Vol.1
	Idaho National Engineering Lab., Idaho Falls (USA)	
	8:23607	EGG-TMI—5966-Rev.1
	8:23608	EGG-TMI—6198
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:23616	GEND—031
	8:23628	NUREG/CR—2531-Rev.1
	8:23631	NUREG/CR—2771
	8:24141	EGG-FM—5667
AC07-79ID01675	**Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)**	
	8:24249	NUREG/CR—1894
AC07-82CE40551	**Little (Arthur D.), Inc., Cambridge, MA (USA)**	
	8:23857	DOE/CE/40551—T1
AC08-81DP40162	**MPB Technologies, Inc., Ste-Anne-de-Bellevue, Quebec (Canada)**	
	8:24826	DOE/DP/40162—1
AC08-82NV10249	**CER Corp., Las Vegas, NV (USA)**	
	8:23059	DOE/NV/10249—T1
AC09-76SR00001	**Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)**	
	8:23113	DP-tr—37(Feb 1977).
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.	
	8:23116	DP-MS—80-115
	8:24234	DP—1639
	8:24250	Journal of Applied Meteorology 21 NO. 11. 1633-1644 (Nov 1982).
	8:24253	Journal of Applied Meteorology 21 NO. 11. 1622-1632 (Nov 1982).
AC09-82SR11018	**Allied-General Nuclear Services, Barnwell, SC (USA)**	
	8:23115	DOE/SR/11018—T1
AC11-76PN00292	**Duquesne Light Co., Shippingport, PA (USA)**	
	8:23470	DLCS—5000482
AC13-76GJ01664	**Bendix Field Engineering Corp., Grand Junction, CO (USA)**	
	8:23098	GJBX—376(81)
	8:23099	GJBX—377(81)
	8:23100	GJBX—378-81
AC19-81BC10467	**Southwest Research Inst., San Antonio, TX (USA). Energy System Research Div.**	
	8:23879	DOE/BC/10467—11
	8:23880	DOE/BC/10467—12
	8:23881	DOE/BC/10467—13
AC20-82LC10910	**Foster Wheeler Synfuels Corp., Livingston, NJ (USA)**	
	8:23085	DOE/LC/10910—T1
AC21-79MC08339	**Donohue, Anstey and Morrill, Boston, MA (USA)**	
	8:23054	DOE/MC/08339—1348
AC21-80MC14060	**Gruy Federal, Inc., Houston, TX (USA)**	
	8:23056	DOE/MC/14060—T1
AC21-80MC14129	**National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.**	
	8:24151	DOE/MC/14129—1375
AC21-80MC14600	**Ingersoll-Rand Research, Inc., Princeton, NJ (USA)**	
	8:22924	DOE/MC/14600—T1
AC21-80MC14693	**Cliffs Minerals, Inc., Granville, WV (USA)**	
	8:23057	DOE/MC/14693—1296-Vol.1
	8:23058	DOE/MC/14693—1296-Vol.2
AC21-81MC16528	**Pittsburgh Univ., PA (USA). Dept. of Civil Engineering**	
	8:22925	DOE/MC/16528—1328
AC22-77ET12188	**Booz, Allen and Hamilton, Inc., Cleveland, OH (USA)**	
	8:22984	DOE/ET/12188—1
AC22-78ET12103	**Filtrol Corp., Los Angeles, CA (USA)**	
	8:22921	DOE/ET/12103—T5
AC22-80ET14052	**McDonnell Douglas Electronics Co., St. Charles, MO (USA)**	
	8:22973	DOE/ET/14054—4
AC22-81PC40089	**Southwest Research Inst., San Antonio, TX (USA). Applied Physics Div.**	
	8:22929	DOE/PC/40089—T2
AC22-81PC40265	**Babcock and Wilcox Co., Alliance, OH (USA). Research and Development Div.**	
	8:22999	DOE/PC/40265—6
AI01-76ET10136	**Geological Survey, Reston, VA (USA)**	
	8:23051	DOE/ET/10136—T1
	8:23061	USGS-OFR—80-938
	8:23062	USGS-OFR—81-181
AI01-77ET10350	**National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center**	
	8:23415	DOE/NASA/10350—35
AI08-78ET44802	**Geological Survey, Denver, CO (USA)**	
	8:24484	DOE/ET/44802—T5
AM01-76EI02295	**Massachusetts Inst. of Tech., Cambridge (USA)**	
	8:23748	MIT-EL—82-025-Exec.Summ.
AM03-76SF00010	**Scripps Inst. of Oceanography, San Diego, La Jolla, CA**	
	8:24272	Marine Ecology: Progress Series 6 149-159 (15 Oct 1981).
	8:24273	Marine Ecology: Progress Series 6 213-222 (15 Oct 1981).
	8:24350	Marine Ecology: Progress Series 5 103-106 (30 Apr 1981).
	8:24351	Marine Ecology: Progress Series 5 85-89 (30 Apr 1981).
	8:24783	Physics of Fluids 26 NO. 3. 705-723 (Mar 1983).
	8:24848	Physics of Fluids 26 NO. 3. 780-789 (Mar 1983).
	8:24882	Journal of Nuclear Materials 111 493-497 (Nov-Dec 1982).
	8:24905	Journal of Nuclear Materials 111 844-847 (Nov-Dec 1982).
AM03-76SF00034	**Physics Department, University of California, Irvine, California 92717**	
	8:24788	Physics of Fluids 26 NO. 3. 797-804 (Mar 1983).
AM06-76RL02230	**Los Alamos National Lab., NM (USA)**	
	8:24612	LA—8775-C(Mar 1981).
AM21-78MC08216	**Science Applications, Inc., Morgantown, WV (USA)**	
	8:23052	DOE/MC/08216—1257
	8:23053	DOE/MC/08216—T5
	8:23072	DOE/MC/08216—T3
	Science Applications, Inc., Fort Collins, CO (USA)	
	8:23073	DOE/MC/08216—T4
AP01-82PE70410	**RAND Corp., Santa Monica, CA (USA)**	
	8:23723	DOE/NBB—0027
AP21-79MC12159	**GeoEnergy Corp., Las Vegas, NV (USA)**	
	8:23055	DOE/MC/12159—1344
AS01-78ET29135	**Univ. of California, Berkeley**	
	8:23441	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Circuits and Syst
AS05-76ER03948	**Los Alamos National Lab., NM (USA)**	
	8:24595	LA—8775-C(Mar 1981).
AS05-76ER04936	**Tennessee Univ., Knoxville (USA). Dept. of Physics**	
	8:24672	CONF-821143—6
	Oak Ridge Associated Universities, Inc., TN (USA)	
	8:24704	CONF-821143—5

Contract No.	Abstract No.	Report No.
AS05-76EV04703	Oak Ridge National Lab., TN (USA)	
	8:24523	DOE/EV/04703—37
	Tennessee Univ., Knoxville (USA). Dept. of Physics	
	8:24524	DOE/EV/04703—38
	8:24525	DOE/EV/04703—39
	Tennessee Univ., Knoxville (USA). Dept. of Physics and Astronomy	
	8:24526	DOE/EV/04703—40
AS05-76OR04940	Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Biology	
	8:23039	DOE/OR/04940—3
AS05-77EV05572	Old Dominion Univ., Norfolk, VA (USA). Research Foundation	
	8:24268	DOE/EV/05572—4
AS05-79ER10407	North Carolina State Univ., Raleigh (USA). Dept. of Physics	
	8:24641	DOE/ER/10407—3
AS05-79ER10477	Rice Univ., Houston, TX (USA). Dept. of Chemistry	
	8:24081	DOE/ER/10477—3
AS05-81ER10959	Virginia Univ., Charlottesville (USA). Dept. of Physics	
	8:24745	DOE/ER/10959—2
AS07-77ET28365	Colorado Dept. of Natural Resources, Denver (USA)	
	8:23368	DOE/ET/28365—24
	8:23369	DOE/ET/28365—26
AS07-78ID01821	Utah Univ., Salt Lake City (USA). Earth Science Lab.	
	8:23370	DOE/ID/01821—T1
AS09-76ER00854	Georgia Univ., Athens (USA). Dept. of Chemistry	
	8:24047	DOE/ER/00854—39
AS09-76EV00902	North Carolina State Univ., Raleigh (USA)	
	8:24502	DOE/EV/00902—34
AS19-80BC10215	Oral Roberts Univ., Tulsa, OK (USA)	
	8:24497	DOE/BC/10215—23
AS19-81BC10498	Stanford Univ., CA (USA). Dept. of Geophysics	
	8:23050	DOE/BC/10498—5
AT03-76ER70064	Stanford Univ., CA (USA). School of Engineering	
	8:24723	DOE/ER/70064—T1
AT03-76ER70227	Institute of Applied Physical Sciences, University of California-San Diego, La Jolla, California	
	8:24041	Journal of Low Temperature Physics 49 NO. 5. 573-584 (1 Dec 1982).
AT03-76ET51011	GA Technologies, Inc., San Diego, CA (USA)	
	8:24763	GA-A—16853
	8:24786	Physics of Fluids 26 NO. 3. 766-774 (Mar 1983).
	8:24829	GA-A—16845
AT03-76SF70010	Foster Wheeler Corp., Livingston, NJ (USA). Nuclear Dept.	
	8:23518	DOE/SF/70010—T34
AT03-76SF70046	General Atomic Co., San Diego, CA (USA)	
	8:23538	GA-A—16356
AT03-76SF70281	Scripps Institution of Oceanography, San Diego, CA (USA). Marine Physical Lab.	
	8:24156	MPL-U—34/78
AT03-80SF11512	General Atomic Co., San Diego, CA (USA	
	8:24866	Journal of Nuclear Materials 111 362-369 (Nov-Dec 1982).
AT06-76ER70004	Oregon Univ., Eugene (USA). Inst. of Theoretical Science	
	8:24606	DOE/ER/70004—295
	8:24631	DOE/ER/70004—297
	8:24637	DOE/ER/70004—290
AT06-76ER71015	Washington State Univ., Pullman (USA)	
	8:24059	DOE/ER/71015—T1
AT06-76ET20316	Oregon State Univ., Corvallis (USA)	
	8:23388	DOE/ET/20316—81-1
EX-76-A-01-2295-056	Massachusetts Inst. of Tech., Cambridge (USA). Francis Bitter National Magnet Lab.	
	8:22985	DOE/NBM—3003138
FC01-80CS20156	American Public Works Association, Washington, DC	
	8:23875	DOE/CS/20156—T2
FC02-80ET14759	Grace (W.R.) and Co., Memphis, TN (USA). Agricultural Chemicals Group	
	8:22922	DOE/ET/14759—T14
FC04-77ET20216	Georgia Power Co., Shenandoah (USA)	
	8:23301	DOE/ET/20216—T2
FC05-77ET10069	Exxon Research and Engineering Co., Florham Park, NJ (USA)	
	8:22919	DOE/ET/10069—T6
FC07-80ID12117	New York State Electric and Gas Corp., Binghamton (USA)	
	8:23245	DOE/RA/12117—3
FC07-80ID12206	Missouri Univ., Columbia (USA). Dept. of Civil Engineering	
	8:23243	DOE/ID/12206—1
	8:23244	DOE/ID/12206—2
FC20-78LC10787	Geokinetics, Inc., Salt Lake City, UT (USA)	
	8:23089	DOE/LC/10787—111
FG01-79CS30013	Alabama Univ., Huntsville (USA). Kenneth E. Johnson Environmental and Energy Center	
	8:23001	DOE/CS/30013—T7
FG01-80RA50377	Nashville Electric Service, TN (USA)	
	8:23862	DOE/RA/50377—2
FG01-80RG10268	National Regulatory Research Inst., Columbus, OH (USA)	
	8:23065	DOE/RG/10268—T4
	8:23536	DOE/RG/10268—T3
FG01-81RA50362	Fluor Engineers and Constructors, Inc., Irvine, CA (USA)	
	8:23228	DOE/RA/50362—1395-Vol.2-Pt.1
	8:23229	DOE/RA/50362—1395-Vol.2-Pt.2
	Purvin and Gertz, Inc., Dallas, TX (USA)	
	8:23230	DOE/RA/50362—1395-Vol.3
	Dillon, Read and Co., Inc., New York (USA)	
	8:23231	DOE/RA/50362—1395-Vol.5
	Hamel, Park, McCabe and Saunders, Washington, DC (USA)	
	8:23232	DOE/RA/50362—1395-Vol.6
	Dames and Moore, Los Angeles, CA (USA)	
	8:23233	DOE/RA/50362—1395-Vol.7-App.
	8:23234	DOE/RA/50362—1395-Vol.7-Pt.1
	8:23235	DOE/RA/50362—1395-Vol.7-Pt.2
	Boyd (John T.) Co., Pittsburgh, PA (USA)	
	8:23236	DOE/RA/50362—1395-Vol.8
FG02-79R510145	Dryermate Co., Xenia, OH (USA)	
	8:23814	DOE/R5/10145—T1
FG02-81R510322	Cleveland Public Schools, OH (USA). Dept. of Research and Analysis	
	8:23815	DOE/R5/10322—2
FG03-78SF01932	International Business Machines Corp., Gaithersburg, MD (USA)	
	8:23336	SOLAR/1046—79/14
FG05-80ET53088	Texas Univ., Austin (USA)	
	8:24762	DOE/ET/53088—84
	8:24782	Physics of Fluids 26 NO. 3. 700-704 (Mar 1983).
FG07-80R000099	Kent Associates, Lake Oswego, OR (USA)	
	8:23380	DOE/OR/00099—T1
FG07-81ID12225	Pennsylvania State Univ., University Park (USA). Dept. of Mechanical Engineering	
	8:23861	DOE/ID/12225—T2
FG07-81ID12348	Kentucky Natural Resources and Environmental Protection Cabinet, Frankfort (USA)	
	8:23121	DOE/ID/12348—T4

Contract No.	Abstract No.	Report No.
FG22-80PC30250	Pennsylvania State Univ., University Park (USA)	
	8:24057	CONF-811242—2
NAS-7-100-955282	Siltec Corp., Menlo Park, CA (USA)	
	8:23266	DOE/JPL/955282—80/7
NAS-7-100-955843	Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center	
	8:23267	DOE/JPL/955843—83/8
NAS-7-100-955902	Solarex Corp., Rockville, MD (USA)	
	8:23268	DOE/JPL/955902—82/7
NAS-7-100-955909	Westinghouse Electric Corp., Pittsburgh, PA (USA). Advanced Energy Systems Div.	
	8:23269	DOE/JPL/955909—83/9
W-31-109-ENG-38	Argonne National Lab., IL (USA)	
	8:22946	CONF-820627—14
	Illinois Univ., Chicago (USA). Dept. of Energy Engineering	
	8:22947	CONF-821008—3
	Argonne National Lab., IL (USA)	
	8:23088	CONF-820441—6
	8:23119	CONF-820303—44
	8:23120	CONF-8209104—2
	8:23183	CONF-820911—4
	8:23190	CONF-830423—1
	8:23214	CONF-810497—4
	8:23215	CONF-810497—5
	8:23216	CONF-811276—1
	8:23256	ANL/CNSV—36
	8:23257	ANL/EES-TM—208
	8:23299	CONF-8208116—1
	ECA, Inc., Woodridge, IL (USA)	
	8:23315	CONF-810402—14
	Argonne National Lab., IL (USA)	
	8:23316	CONF-820309—6
	8:23356	CONF-820814—44
	8:23408	CONF-8104192—2
	8:23409	CONF-8104197—1
	8:23427	ANL/EES-TM—210
	8:23442	DOE/NBM—3008716
	8:23469	CONF-810625—23
	8:23516	CONF-8106164—5
	8:23541	CONF-810507—2
	8:23542	CONF-820601—27
	8:23573	CONF-810545—8
	8:23575	CONF-810233—2
	8:23576	CONF-820420—12
	8:23586	CONF-810905—41
	8:23587	CONF-820406—27
	8:23588	CONF-820604—14
	8:23589	CONF-820704—37
	UKAEA Risley Nuclear Power Development Establishment	
	8:23590	CONF-820704—38
	Argonne National Lab., IL (USA)	
	8:23591	CONF-820704—39
	8:23592	CONF-820704—40
	8:23593	CONF-820704—41
	8:23594	CONF-820704—42
	8:23595	CONF-820704—43
	8:23596	CONF-820717—5
	8:23597	CONF-820717—6
	8:23598	CONF-820717—7
	8:23599	CONF-820717—8
	8:23600	CONF-820810—17
	8:23601	CONF-820810—18
	8:23602	CONF-820814—39
	8:23603	CONF-820962—4
	Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.	
	8:23604	CONF-821155—7
	Argonne National Lab., IL (USA)	
	8:23605	CONF-8110112—2
	Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering	
	8:23635	NUREG/CR—3167
	Argonne National Lab., IL (USA)	
	8:23664	ANL/SPG—22
	8:23672	CONF-820814—42
	Johnson Controls, Inc., Milwaukee, WI (USA). Globe Battery Div.	
	8:23673	CONF-820907—4

Contract No.	Abstract No.	Report No.
	Argonne National Lab., IL (USA)	
	8:23674	CONF-821015—6
	8:23675	CONF-821015—7
	8:23676	CONF-821015—9
	8:23677	CONF-821106—29
	8:23678	CONF-821211—6
	8:23685	CONF-810203—18
	8:23686	CONF-8103162—1
	8:23692	DOE/NBM—3007739
	8:23696	CONF-810574—3
	8:23697	CONF-820422—4
	8:23698	CONF-8203121—1
	8:23700	CONF-820627—15
	8:23701	CONF-820814—43
	8:23703	ANL/CNSV-TM—107
	8:23704	ANL/CNSV-TM—111
	8:23728	CONF-810842—9
	8:23729	CONF-820203—6
	8:23754	CONF-8104198—1
	8:23767	CONF-810106—5
	8:23768	CONF-810106—6
	8:23769	CONF-810106—7
	8:23770	CONF-810106—8
	8:23771	CONF-810574—2
	8:23772	CONF-820814—38
	Giner, Inc., Waltham, MA (USA)	
	8:23781	ANL-K—83-12-Pt.1
	8:23782	ANL-K—83-12-Pt.2
	Argonne National Lab., IL (USA)	
	8:23793	ANL/EES-TM—207-Vol.1
	8:23841	ANL/CNSV-TM—108
	Hudson Associates, Santa Barbara, CA (USA)	
	8:23842	ANL/EES-TM—211
	Argonne National Lab., IL (USA)	
	8:23843	CONF-820128—7
	8:23846	ANL-CT—80-3-Add.3
	8:23856	CONF-810545—11
	8:23871	ANL/CNSV-TM—109
	8:23873	CONF-8204119—1
	8:23883	CONF-820814—40
	8:23884	CONF-821015—8
	8:23885	CONF-8104192—3
	Katholieke Univ. Nijmegen (Netherlands)	
	8:23888	CONF-8209105—1
	Argonne National Lab., IL (USA)	
	8:23893	CONF-810756—4
	Northwestern Univ., Evanston, IL (USA)	
	8:23894	CONF-810809—30
	Argonne National Lab., IL (USA)	
	8:23931	CONF-811145—18
	8:23932	CONF-811150—13
	8:23933	CONF-811150—14
	8:23934	CONF-811150—15
	8:23935	CONF-811150—16
	8:23936	CONF-811150—17
	8:23937	CONF-811150—18
	8:23939	CONF-820274—2
	8:23940	CONF-820434—17
	8:23941	CONF-820434—18
	Brandeis Univ., Waltham, MA (USA). Dept. of Physics	
	8:23942	CONF-820434—19
	Argonne National Lab., IL (USA)	
	8:23943	CONF-820628—22
	8:23944	CONF-820659—8
	8:23945	CONF-820659—9
	8:23946	CONF-820776—1
	8:23947	CONF-820929—12
	8:23948	CONF-821049—18
	8:23949	CONF-8209106—1
	8:23953	DOE/NBM—3007960
	8:23992	ANL/FPP/TM—166
	8:23995	CONF-810347—6
	8:23996	CONF-810809—32
	8:23997	CONF-820548—6
	8:23998	CONF-820605—27
	8:23999	CONF-820659—6
	8:24000	CONF-820864—4
	8:24001	CONF-820909—19
	8:24002	CONF-820929—13
	8:24029	CONF-810566—12
	8:24030	CONF-810736—3

Contract No.	Abstract No.	Report No.
	8:24031	CONF-8010322—1
	8:24046	CONF-810740—3
	8:24056	CONF-810860—12
	8:24058	CONF-820508—8
	8:24078	CONF-820773—1
	8:24102	CONF-811051—4
	Argonne National Lab., Idaho Falls, ID (USA)	
	8:24103	CONF-820609—81
	Argonne National Lab., IL (USA)	
	8:24148	ANL/FE—82-4
	8:24149	CONF-810581—3
	8:24150	CONF-821176—1
	8:24157	CONF-810545—10
	8:24159	CONF-821066—3
	8:24171	ANL—83-14
	8:24172	CONF-810523—19
	8:24173	CONF-811012—67
	Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Physics	
	8:24174	CONF-820428—11
	Argonne National Lab., IL (USA)	
	8:24175	CONF-821123—38
	National Bureau of Standards, Washington, DC (USA). Synchrotron Ultraviolet Radiation Facility	
	8:24209	CONF-820839—7
	Argonne National Lab., IL (USA)	
	8:24230	CONF-810296—1
	8:24231	CONF-820101—6
	8:24252	CONF-810545—7
	8:24255	ANL/EES-TM—209
	8:24348	CONF-800879—2
	8:24362	CONF-810153—4
	8:24363	CONF-8104153—4
	8:24364	CONF-8205170—1
	8:24400	CONF-810488—7
	8:24401	CONF-810545—9
	8:24402	CONF-810631—8
	8:24406	CONF-8205169—1
	8:24514	CONF-810109—2
	8:24515	CONF-810109—3
	8:24516	CONF-810109—4
	8:24517	CONF-810432—5
	8:24518	CONF-810868—6
	National Bureau of Standards, Washington, DC (USA). Synchrotron Ultraviolet Radiation Facility	
	8:24519	CONF-820883—3
	Argonne National Lab., IL (USA)	
	8:24520	CONF-8103163—2
	8:24521	CONF-8209101—3
	8:24555	Physical Review [Section] A: General Physics 26 NO. 6. 3283-3292 (Dec 1982).
	8:24557	Physical Review [Section] A: General Physics 26 NO. 6. 3700-3701 (Dec 1982).
	8:24570	CONF-810809—31
	8:24605	CONF-820899—3
	8:24644	CONF-820357—8
	8:24651	CONF-8110242—3
	8:24681	CONF-820738—6
	8:24703	CONF-810107—7
	8:24721	CONF-820274—3
	8:24722	CONF-820397—2
	8:24739	CONF-8206162—1
	8:24759	CONF-821045—3
	8:24816	ANL/FPP—82-1
	8:24817	ANL/FPP/TM—162
	8:24818	ANL/FPP/TM—168
	8:24819	CONF-810812—48
	8:24820	CONF-810831—103
	Texas A and M Univ., College Station (USA)	
	8:24821	CONF-811040—198
	Argonne National Lab., IL (USA)	
	8:24822	CONF-811040—199
	8:24823	CONF-811040—200
	8:24824	CONF-811040—201
	8:24825	CONF-811103—128
	8:25266	CONF-810546—5
	8:25267	CONF-820322—4
	8:25268	CONF-8110259—1
W-7405-ENG-26	**Oak Ridge National Lab., TN (USA)**	
	8:22898	ORNL—5944
	8:22955	EPRI-EA—2867
	Oak Ridge Gaseous Diffusion Plant, TN (USA)	
	8:23103	K/OA—5424
	8:23191	K/OA—5014
	8:23288	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
	8:23296	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
	Oak Ridge National Lab., TN (USA)	
	8:23393	CONF-820134—1
	8:23543	NUREG/CR—0200-Vol.2
	8:23553	Ukrainskii Fizicheskii Zhurnal (Russian Edition) 11 NO. 2. 209-211 (1966).
	8:23556	NUREG/CR—3114
	8:23695	Resources and Energy 4 NO. 4. 307-328 (Dec 1982).
	8:23938	CONF-820205—6
	8:23989	skiej NO. 16. 247-257 (1979).
	8:23990	
	8:24009	Physical Review [Section] B: Condensed Matter 26 NO. 12. 6909-6917 (15 Dec 1982).
	8:24073	Polymer 21 131-132 (Feb 1980).
	North Carolina State Univ., Raleigh (USA). Dept. of Botany	
	8:24403	CONF-820275—1
	8:24559	Chemical Physics Letters 79 NO. 1. 142-148 (1 Apr 1981).
	8:24730	Physical Review [Section] A: General Physics 26 NO. 6. 3477-3482 (Dec 1982).
	8:24744	Surface Science 108 605-616 (1981).
	8:24780	Physics of Fluids 26 NO. 3. 678-683 (Mar 1983).
	8:24790	Physics of Fluids 26 NO. 3. 820-829 (Mar 1983).
	8:24793	Journal of Nuclear Materials 111 413-419 (Nov-Dec 1982).
	Varian Associates, Palo Alto, CA (USA). Palo Alto Microwave Tube Div.	
	8:24836	ORNL/Sub—79/21453/13
	8:24850	Journal of Nuclear Materials 111 253-267 (Nov-Dec 1982).
	8:24872	Journal of Nuclear Materials 111 424-427 (Nov-Dec 1982).
	8:24879	Journal of Nuclear Materials 111 479-484 (Nov-Dec 1982).
	8:24899	Journal of Nuclear Materials 111 636-641 (Nov-Dec 1982).
	8:24903	Journal of Nuclear Materials 111 827-830 (Nov-Dec 1982).
W-7405-ENG-36	**Los Alamos National Lab., NM (USA)**	
	8:23007	LA—9661-MS
	8:23147	LA—9427-Vol.1
	8:23192	LA—9633-MS
	8:23193	LA—9665-MS
	8:23202	LA—9673-PR
	8:23372	LA—9671-HDR
	8:23551	NUREG/CR—3135
	8:23969	LALP—83-4
	8:24005	LA—9650-MS
	8:24020	
	8:24021	
	8:24133	Journal of Applied Physics 54 NO. 3. 1224-1227 (Mar 1983).
	8:24168	LA-UR—81-2661

Contract No.	Abstract No.	Report No.
	8:24183	LA—9511-C
	8:24184	LA—9537-MS
	8:24210	Applied Optics 21 NO. 19. 3597-3601 (1 Oct 1982).
	8:24211	LA—9620
	8:24212	LA-UR—81-2737
	8:24485	LA—9324-MS
	8:24489	LA—9679-PR
	8:24490	LA-UR—83-117
	8:24491	LA-UR—83-250
	8:24508	LA—9636-MS
	Rice Univ., Houston, TX (USA)	
	8:24545	LA—9582-C
	Los Alamos National Lab., NM (USA)	
	8:24578	LA—8775-C
	8:24726	LA—9610-MS
	8:24727	LA-UR—82-3299
	8:24764	LA-UR—83-291
	8:25275	LA—9617-MS
W-7405-ENG-48	**Lawrence Livermore National Lab., CA (USA)**	
	8:23068	UCRL—53383
	8:23069	UCRL—88780
	8:23070	UCRL—88781
	8:23071	UCRL—88782
	8:23086	UCRL—88908
	8:23176	UCRL—88167
	Terra Tek, Inc., Salt Lake City, UT (USA)	
	8:23373	LBL—11499
	Lawrence Livermore National Lab., CA (USA)	
	8:23429	UCRL—88867
	8:23467	UCID—19474
	8:23531	UCID—19701
	8:23544	UCRL—53369-Vol.1
	8:23545	UCRL—53369-Vol.2
	8:23567	UCID—19475
	8:23568	UCID—19700
	8:23569	UCID—19702
	8:23638	UCID—19473
	8:24008	UCID—19663
	8:24033	UCID—19727
	8:24037	Physical Review [Section] B: Condensed Matter 26 NO. 12. 6661-6668 (15 Dec 1982).
	8:24080	Inorganica Chimica Acta 48 117-124 (1981).
	8:24114	UCRL—53377
	8:24140	Journal of Applied Mechanics 48 701-706 (Dec 1981).
	8:24143	UCID—19677
	8:24189	UCRL—88283
	8:24215	UCID—19735
	8:24216	UCID—19740
	8:24217	UCRL—53150
	8:24218	UCRL—53393
	8:24220	UCID—19305
	8:24243	UCRL—53288
	8:24244	UCRL—53311
	Scripps Institution of Oceanography, San Diego, CA (USA)	
	8:24269	DOE/NBB—0022
	Lawrence Livermore National Lab., CA (USA)	
	8:24295	UCRL—88812
	8:24326	Cytometry (Baltimore) 3 NO. 1. 64-65 (1982).
	Lawrence Berkeley Lab., CA (USA)	
	8:24342	LBL—13091
	8:24455	Forest Science 28 NO. 2. 257-273 (1982).
	Teledyne Geotech, Alexandria, VA (USA)	
	8:24494	UCRL—15520
	8:24507	Comments on Nuclear and Particle Physics 9 NO. 6. 185-197 (1981).
	Lawrence Livermore National Lab., CA (USA)	
	8:24546	UCID—19741
	8:24562	International Journal of Chemical Kinetics 13 1125-1131 (1981).
	8:24563	International Journal of Quantum Chemistry 20 1255-1271 (1981).
	8:24565	Faraday Discussions of the Chemical Society NO. 71. 191-203 (1981).
	8:24572	Physical Review [Section] B: Condensed Matter 26 NO. 12. 7019-7022 (15 Dec 1982).
	Lawrence Berkeley Lab., CA (USA)	
	8:24741	LBL—13220
	Lawrence Livermore National Lab., CA (USA)	
	8:24776	UCRL—88562
	8:24789	Physics of Fluids 26 NO. 3. 808-819 (Mar 1983).
	8:24838	UCID—19638
	8:24839	UCID—19748
	8:24840	UCRL—15521-Vol.1
	8:24841	UCRL—15521-Vol.2
	8:24842	UCRL—52000-83-1
	8:24844	UCRL—53344-Vol.4
	8:24845	UCRL—85986
	8:24846	UCRL—88222
	8:24847	Journal of Applied Physics 54 NO. 3. 1209-1217 (Mar 1983).
	8:24849	Physics of Fluids 26 NO. 3. 830-834 (Mar 1983).
	8:25232	UCRL—88904
	8:25279	UCID—19681
W-7405-ENG-82	**Ames Lab., IA (USA)**	
	8:22991	IS—4766
	8:23973	Journal of Applied Physics 54 NO. 3. 1471-1475 (Mar 1983).
	8:23974	Journal of Applied Physics 54 NO. 3. 1476-1478 (Mar 1983).
	8:24638	Journal of Mathematical Physics (New York) 24 NO. 3. 576-587 (Mar 1983).

REPORT NUMBER INDEX

The numbers assigned to all reports cited in the publication appear in the first column of the index. Cross reference information and/or availability are included as appropriate. Abbreviations used in the availability column are elaborated at the end of the index. To expedite the filling of orders for reports from NTIS and TIC, an order number in the form, DE82000001, appears in column 3. Requesters are urged to use this order number where provided. In column 4, one or more DOE distribution categories are indicated, e.g. , STD-10, MN-25. STD indicates distribution was made in full-size copy; MN indicates microcopy distribution. These category numbers are included to assist DOE librarians in responding to requests for reports in their collections. The UC (Unclassified Distribution Categories) are defined in DOE/TIC-4500, available from TIC. The citation numbers are given in column 5. NOTE: DOE attempts to disseminate its information as broadly as possible. Even though a report may contain some degree of illegibility, it is believed that the report may still make a contribution. The presence of a 1, 2, or 3 following NTIS in the availability column denotes the extent to which a report may be illegible and the form in which it is available: 1 = 1 to 5% illegibility, available PC and MF; 2 = 6 to 10% illegibility, available MF only; 3 = 11% or more illegibility, available PC only.

Report No.	*Availability*	*Order No.*	*Distribution Category*	*Abstract No.*
ABCC-TR-				
33-71	NTIS, PC A02/MF A01; 1	DE83008983	MN -48	8:24357
ACIRL-PR-				
81-9	Australian Coal Industry Research Labs. Ltd., North Ryde			8:22967
AD-A-				
120526/ 9	NTIS, PC A03/MF A01			8:23763
120639/ 0	NTIS, PC A11/MF A01			8:23870
120667/ 1	NTIS, PC A02/MF A01			8:24358
120671/ 3	NTIS, PC A09/MF A01			8:23046
120701/ 8	NTIS, PC A04/MF A01			8:24221
120814/ 9	NTIS, PC A06/MF A01			8:23290
120853/ 7	NTIS, PC A03/MF A01			8:23668
120939/ 4	NTIS, PC A03/MF A01			8:23991
121011/ 1	NTIS, PC A11/MF A01			8:23047
121029/ 3	NTIS, PC A03/MF A01			8:23661
121033/ 5	NTIS, PC A03/MF A01			8:23397
121241/ 4	NTIS, PC A03/MF A01			8:24222
121252/ 1	NTIS, PC A06/MF A01			8:23252
121318/ 0	NTIS, PC A03/MF A01			8:23255
121476/ 6	NTIS, PC A04/MF A01			8:23044
121588/ 8	NTIS, PC A02/MF A01			8:23104
121701/ 7	NTIS, PC A05/MF A01			8:24359
121861/ 9	NTIS, PC A03/MF A01			8:23030
122093/ 8	NTIS, PC A10/MF A01			8:24083
122137/ 3	NTIS, PC A03/MF A01			8:23891
122204/ 1	NTIS, PC A05/MF A01			8:24360
122242/ 1	NTIS, PC A10/MF A01			8:24361
122283/ 5	NTIS, PC A02/MF A01			8:23669
122408/ 8	NTIS, PC A04/MF A01			8:23845
122525/ 9	NTIS, PC A03/MF A01			8:24399
122574/ 7	NTIS, PC A04/MF A01			8:23240
122599/ 4	NTIS, PC A02/MF A01			8:24307
951840/ 8	NTIS, PC A04/MF A01			8:24223
AD-B-				
066872/ 3	NTIS, PC A06/MF A01			8:24477
ALO-				
1983	NTIS, PC A06/MF A01; 1	DE83009282	MN -2	8:24219
3994-83/ 1	*See* DOE/ET/20216-T2	DE83009270	STD -62a	8:23301
5365-4	NTIS, PC A02/MF A01; 1	DE83008760	MN -38	8:23350
ANL-				
83-7	*See* NUREG/CR-3167	DE83008459	MN -78	8:23635
83-14	NTIS, PC A08/MF A01; 1	DE83008918	STD -34C	8:24171
ANL/CNSV-				
36	NTIS, PC A04/MF A01	DE83008717	STD -61a	8:23256
ANL/CNSV-TM-				
107	NTIS, PC A06/MF A01	DE83008637	MN -95d	8:23703
108	NTIS, PC A03/MF A01	DE83008634	MN -96	8:23841
109	NTIS, PC A05/MF A01; 1	DE83008635	MN -61a	8:23871
111	NTIS, PC A04/MF A01	DE83008638	MN -95d	8:23704
ANL-CT-				
80-3-Add.3	NTIS, PC A03/MF A01	DE83008726	STD -95f	8:23846
ANL/EES-TM-				
207-Vol.1	NTIS, PC A05/MF A01	DE83008636	MN -95d	8:23793
208	NTIS, PC A05/MF A01	DE83008640	MN -61a	8:23257
209	NTIS, PC A05/MF A01	DE83008633	MN -11	8:24255
210	NTIS, PC A04/MF A01	DE83008641	MN -12	8:23427
211	NTIS, PC A04/MF A01	DE83008639	MN -96	8:23842
ANL/FE-				
82-4	NTIS, PC A05/MF A01	DE83008725	STD -90e	8:24148

Report No.	Availability	Order No.	Distribution Category	Abstract No.
ANL/FPP-				
82-1	NTIS, PC A99/MF A01; 1	DE83008919	STD -20d	8:24816
ANL/FPP/TM-				
162	NTIS, PC A04/MF A01	DE83009478	STD -20d	8:24817
166	NTIS, PC A04/MF A01	DE83009468	STD -20	8:23992
168	NTIS, PC A03/MF A01	DE83009477	STD -20d	8:24818
ANL-K-				
83-12-Pt.1	NTIS, PC A06/MF A01; 1	DE83008715	MN -93	8:23781
83-12-Pt.2	NTIS, PC A02/MF A01	DE83008714	MN -93	8:23782
ANL/NESC-				
749	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048749	ND -2	8:24758
750R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048750	ND -2	8:24084
751R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048751	ND -2	8:23508
753	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048753	ND -2	8:25233
754	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048754	ND -2	8:24716
755	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048755	ND -2	8:23509
756	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048756	ND -2	8:24717
757	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048757	ND -2	8:24671
758	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048758	ND -2	8:24718
759	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048759	ND -2	8:24085
760	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048760	ND -2	8:24086
761R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048761	ND -2	8:23510
762R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048762	ND -2	8:23511
763	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048763	ND -2	8:23445
764	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048764	ND -2	8:25234
765	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048765	ND -2	8:25235
766	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048766	ND -2	8:25236
767	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048767	ND -2	8:23579
768	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048768	ND -2	8:23512
769	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048769	ND -2	8:25237
770	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048770	ND -2	8:23554
771	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048771	ND -2	8:24135
773	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048773	ND -2	8:25238
774	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048774	ND -2	8:24301
775	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048775	ND -2	8:24567

Report No.	Availability	Order No.	Distribution Category	Abstract No.
776	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048776	ND -2	8:23468
777	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048777	ND -2	8:25239
778	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048778	ND -2	8:23580
779	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048779	ND -2	8:25240
780	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048780	ND -2	8:23581
781	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048781	ND -2	8:25241
782	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048782	ND -2	8:23794
783	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048783	ND -2	8:23764
784	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048784	ND -2	8:23539
785	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048785	ND -2	8:23513
786	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048786	ND -2	8:24510
787	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048787	ND -2	8:24227
788	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048788	ND -2	8:24228
789	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048789	ND -2	8:24274
790	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048790	ND -2	8:23514
791	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048791	ND -2	8:24165
792	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048792	ND -2	8:24568
793	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048793	ND -2	8:24275
794	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048794	ND -2	8:24276
795	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048795	ND -2	8:24087
797	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048797	ND -2	8:23582
798	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048798	ND -2	8:24088
799	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048799	ND -2	8:23872
800	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048800	ND -2	8:25242
801	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048801	ND -2	8:25224
802	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048802	ND -2	8:23362
803	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048803	ND -2	8:25243
804	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048804	ND -2	8:23583

Report No.	Availability	Order No.	Distribution Category	Abstract No.
805	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048805	ND -2	8:24702
806	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048806	ND -2	8:25244
807	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048807	ND -2	8:24166
808	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048808	ND -2	8:24277
809	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048809	ND -2	8:24089
810R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048810	ND -2	8:24090
811	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048811	ND -2	8:23765
812	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048812	ND -2	8:25245
813	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048813	ND -2	8:24091
814	Availabie from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048814	ND -2	8:24261
815	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048815	ND -2	8:24639
816	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048816	ND -2	8:25246
817	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048817	ND -2	8:23555
818	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048818	ND -2	8:23584
819	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048819	ND -2	8:25247
820	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048820	ND -2	8:25248
821	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048821	ND -2	8:23297
822	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048822	ND -2	8:25249
823R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048823	ND -2	8:24719
824	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048824	ND -2	8:23187
825	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048825	ND -2	8:25250
826R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048826	ND -2	8:24055
827	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048827	ND -2	8:25251
828	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048828	ND -2	8:24092
829	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048829	ND -2	8:25252
830	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048830	ND -2	8:24640
831	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048831	ND -2	8:24093
832	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048832	ND -2	8:24136

Report No.	*Availability*	*Order No.*	*Distribution Category*	*Abstract No.*
833	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048833	ND -2	8:23398
834	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048834	ND -2	8:25253
835	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048835	ND -2	8:23384
836	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048836	ND -2	8:23585
837	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048837	ND -2	8:23399
838	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048838	ND -2	8:25254
840	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048840	ND -2	8:25255
841	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048841	ND -2	8:23663
842	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048842	ND -2	8:23400
843	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048843	ND -2	8:25256
844	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048844	ND -2	8:23446
845	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048845	ND -2	8:23766
846	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048846	ND -2	8:24094
847	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048847	ND -2	8:24569
848	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048848	ND -2	8:25257
949	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048949	MN -2	8:23795
950	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048950	MN -2	8:24095
951	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048951	MN -2	8:24096
952	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048952	MN -2	8:24097
953	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048953	MN -2	8:24098
954	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048954	MN -2	8:24511
955	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048955	MN -2	8:24512
956R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048956	MN -2	8:23110
957	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048957	MN -2	8:23401
958	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048958	MN -2	8:23402
959	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048959	MN -2	8:23111
960	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048960	MN -2	8:23403
961	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048961	MN -2	8:23540

Report No.	Availability	Order No.	Distribution Category	Abstract No.
963	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048963	MN -2	8:24248
964	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048964	MN -2	8:23572
965	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048965	MN -2	8:23404
966	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048966	MN -2	8:24513
967	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048967	MN -2	8:25258
968	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048968	MN -2	8:25259
969	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048969	MN -2	8:23405
970	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048970	MN -2	8:23993
971	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048971	MN -2	8:23406
972	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048972	MN -2	8:25260
973	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048973	MN -2	8:23377
974	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048974	MN -2	8:24026
975	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048975	MN -2	8:25261
976	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048976	MN -2	8:23378
977	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048977	MN -2	8:23379
978	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048978	MN -2	8:23364
979R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048979	MN -2	8:22899
980	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048980	MN -2	8:24099
981	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048981	MN -2	8:23365
982	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048982	MN -2	8:25223
983	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048983	MN -2	8:24167
984	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048984	MN -2	8:24720
985	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048985	MN -2	8:23366
986	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048986	MN -2	8:25262
987	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048987	MN -2	8:24747
988	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048988	MN -2	8:25263
989	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048989	MN -2	8:25264
990	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048990	MN -2	8:23367

Report No.	Availability	Order No.	Distribution Category	Abstract No.
991	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048991	MN -2	8:23311
992	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048992	MN -2	8:24293
995	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048995	MN -2	8:24100
ANL/SPG-				
22	NTIS, PC A03/MF A01	DE83008727	STD -94a	8:23664
ARC-				
5278	*See* DOE/PC/40265-6	DE83009312	MN -90e	8:22999
ARL-TR-				
30	National Research Council of Canada, Halifax, Nova Scotia			8:22900
ASCOT-				
82-6	*See* DP-1639	DE83009386	STD -11	8:24234
BAW-				
1681-2	*See* DOE/ET/34212-36	DE83008575	STD -78	8:23473
BCRA-CRR-				
95	British Carbonization Research Association, Chesterfield			8:22941
96	British Carbonization Research Association, Chesterfield			8:22911
BDX-				
613-2829	NTIS, PC A02/MF A01	DE83009149	MN -38	8:25265
613-2903	NTIS, PC A03/MF A01; 1	DE83006619	MN -25	8:24025
613-2912	NTIS, PC A02/MF A01	DE83009148	MN -38	8:24101
BMFT-FB-DV-				
80-007	NTIS (US Sales Only), PC A18/MF A01; 1	DE83750366	MN -97a	8:23430
BMFT-FB-HA-				
79-19	NTIS (US Sales Only), PC A06/MF A01; 1	DE83750342	MN -13	8:24478
79-20	NTIS (US Sales Only), PC A03/MF A01; 1	DE83750341	MN -88	8:23008
79-22	NTIS (US Sales Only), PC A03/MF A01; 1	DE83750340	MN -88	8:22968
80-033	NTIS (US Sales Only), PC A10/MF A01; 1	DE83750351	MN -88	8:24229
80-036	NTIS (US Sales Only), PC A03/MF A01; 1	DE83750350	MN -88	8:22969
80-041	NTIS (US Sales Only), PC A03/MF A01; 1	DE83750349	MN -88	8:22970
BMFT-FB-M-				
79-06	NTIS (US Sales Only), PC A02/MF A01; 1	DE83750343	MN -4	8:23847
BMFT-FB-T-				
79-78	NTIS (US Sales Only), PC A08/MF A01; 1	DE83750315	MN -90c	8:22912
79-85	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750320	MN -59c	8:23351
79-89	NTIS (US Sales Only), PC A07/MF A01; 1	DE83750328	MN -92	8:23049
79-90	NTIS (US Sales Only), PC A02/MF A01; 1	DE83750317	MN -90i	8:22943
79-91	NTIS (US Sales Only), PC A09/MF A01; 1	DE83750316	MN -25	8:23407
79-92	NTIS (US Sales Only), PC A08/MF A01; 1	DE83750325	MN -95e	8:23848
79-93	NTIS (US Sales Only), PC A03/MF A01	DE83750327	MN -37	8:24496
79-94	NTIS (US Sales Only), PC A02/MF A01; 1	DE83750319	MN -59c	8:23259
79-95	NTIS (US Sales Only), PC A21/MF A01; 1	DE83750321	MN -95e	8:23849
79-96	NTIS (US Sales Only), PC A06/MF A01	DE83750323	MN -95e	8:23850
79-97	NTIS (US Sales Only), PC A05/MF A01; 1	DE83750324	MN -95e	8:23851
79-98	NTIS (US Sales Only), PC A05/MF A01; 1	DE83750322	MN -95e	8:23852
79-99	NTIS (US Sales Only), PC A04/MF A01	DE83750329	MN -11	8:24486
79-100	NTIS (US Sales Only), PC A08/MF A01	DE83750330	MN -58	8:23312
79-101	NTIS (US Sales Only), PC A03/MF A01	DE83750326	MN -59a	8:23796
79-102	NTIS (US Sales Only), PC A06/MF A01; 1	DE83750318	MN -69	8:23217
79-103	NTIS (US Sales Only), PC A03/MF A01; 1	DE83750338	MN -93	8:23783
79-106	NTIS (US Sales Only), PC A06/MF A01; 1	DE83750333	MN -25	8:23892
79-109	NTIS (US Sales Only), PC A04/MF A01	DE83750331	MN -88	8:22971
79-115	NTIS (US Sales Only), PC A16/MF A01; 1	DE83750339	MN -97	8:23431
79-118	NTIS (US Sales Only), PC A08/MF A01; 1	DE83750332	MN -95e	8:23853
79-135	NTIS (US Sales Only), PC A17/MF A01; 1	DE83750334	MN -90c	8:22913
79-139	NTIS (US Sales Only), MF A0106/MF A01; 2	DE83750335	MN -62c	8:23298
79-140	NTIS (US Sales Only), PC A03/MF A01	DE83750336	MN -93	8:23784
79-142	NTIS (US Sales Only), PC A10/MF A01; 1	DE83750337	MN -94ca	8:23670
80-048	NTIS (US Sales Only), PC A04/MF A01	DE83750344	MN -90d	8:22914
80-049	NTIS (US Sales Only), PC A03/MF A01	DE83750346	MN -90b	8:22982
80-051	NTIS (US Sales Only), PC A12/MF A01; 1	DE83750345	MN -4	8:23203
80-052	NTIS (US Sales Only), PC A10/MF A01; 1	DE83750355	MN -95d	8:23797
80-055	NTIS (US Sales Only), PC A99/MF A01; 1	DE83750356	MN -93	8:23785
80-056	NTIS (US Sales Only), PC A03/MF A01	DE83750357	MN -93	8:23786
80-057	NTIS (US Sales Only), PC A08/MF A01; 1	DE83750358	MN -93	8:23787
80-058	NTIS (US Sales Only), PC A11/MF A01; 1	DE83750359	MN -93	8:23788
80-059	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750360	MN -93	8:23789
80-067	NTIS (US Sales Only), PC A03/MF A01	DE83750352	MN -95d	8:23798
80-070	NTIS (US Sales Only), PC A03/MF A01	DE83750353	MN -95d	8:23799
80-072	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750348	MN -95d	8:23800
80-075	NTIS (US Sales Only), PC A03/MF A01	DE83750354	MN -95d	8:23801
80-101	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750347	MN -59	8:23313
80-112	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750363	MN -90i	8:22944
80-114	NTIS (US Sales Only), PC A03/MF A01; 1	DE83750364	MN -95	8:23854
80-115	NTIS (US Sales Only), PC A06/MF A01; 1	DE83750362	MN -94ca	8:23671
80-119	NTIS (US Sales Only), PC A07/MF A01	DE83750361	MN -59c	8:23314
80-121	NTIS (US Sales Only), PC A14/MF A01; 1	DE83750365	MN -38	8:23855
80-122	NTIS (US Sales Only), PC A03/MF A01	DE83750369	MN -92	8:23012
80-123	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750368	MN -92	8:23045
80-124	NTIS (US Sales Only), PC A07/MF A01	DE83750367	MN -90d	8:22915

Report No.	Availability	Order No.	Distribution Category	Abstract No.
80-125	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750373	MN -38	8:23802
80-128	NTIS (US Sales Only), PC A03/MF A01	DE83750372	MN -25	8:23994
80-143	NTIS (US Sales Only), PC A11/MF A01; 1	DE83750371	MN -38	8:23803
BNL-				
31913	NTIS, PC A02/MF A01	DE83008589	MN -28	8:24144
32503	NTIS, PC A02/MF A01; 1	DE83007387	MN -97a	8:23432
32589	NTIS, PC A02/MF A01; 1	DE83008583	MN -34	8:24027
32590	NTIS, PC A02/MF A01; 1	DE83008584	MN -34	8:24028
32591	NTIS, PC A02/MF A01	DE83008585	MN -94d	8:23667
32603	NTIS, PC A02/MF A01; 1	DE83008581	MN -34D	8:24195
51612	NTIS, PC A03/MF A01	DE83008474	STD -70	8:23118
51634	NTIS, PC A02/MF A01	DE83008469	MN -11	8:24266
BNL-NUREG-				
51623	*See* NUREG/CR-3074	DE83008734	MN -80	8:23634
BONN-HE-				
82-13	NTIS (US Sales Only), PC A02/MF A01	DE83750138	MN -34D	8:24630
82-14	NTIS (US Sales Only), PC A02 MF/A01	DE83750136	MN -34D	8:24748
82-15	NTIS (US Sales Only), PC A03/MF A01	DE83750140	MN -34D	8:24749
82-16	NTIS (US Sales Only), PC A03/MF A01	DE83750137	MN -34D	8:24575
82-17	NTIS (US Sales Only), PC A02/MF A01	DE83750139	MN -34D	8:24604
CANMET-				
82-2E	CANMET, 555 Booth Street, Ottawa, Ontario			8:23084
CEA-CONF-				
6298	NTIS (US Sales Only), PC A02/MF A01; 1	DE83770042	MN -61b	8:23260
6419	NTIS (US Sales Only), PC A02/MF A01	DE83770040	MN -63	8:23261
6425	NTIS (US Sales Only), PC A02/MF A01; 1	DE83770041	MN -61c	8:23262
CEND-				
406	*See* DOE/ET/34010-7	DE83009723	STD -78	8:23471
408	*See* DOE/ET/34010-8	DE83009718	STD -78	8:23472
CNEN-RT/AMB-				
82-1	NTIS (US Sales Only), PC A02/MF A01; 1	DE83900868	MN -11	8:24487
82-3	NTIS (US Sales Only), PC A06/MF A01; 1	DE83900859	MN -11	8:24488
CNEN-RT/ING-				
(81) 15	NTIS, PC A09; 3	DE82903105	ND -80	8:23515
CONF-7804203-	(ASCE spring meeting, Pittsburgh, PA, USA, 24-28 Apr 1978)			
1	NTIS, PC A03/MF A01; 1	DE83008418	MN -90i	8:22949
CONF-780611-	(AIChE symposium, Philadelphia, PA, USA, 4-8 Jun 1978)			
17	NTIS, PC A02/MF A01	DE83008434	MN -90d	8:22916
CONF-7809119-	(EPA symposium on coal cleaning to achieve energy and environmental goals, Hollywood, FL, USA, 11-15 Sep 1978)			
3	*See* EPA-600/7-79-098b-Vol.2	DE83007323	MN -90i	8:22992
CONF-781110-	(71. meeting of the AICHE, Miami, FL, USA, 12-16 Nov 1978)			
18	NTIS, PC A03/MF A01	DE83008430	MN -90c	8:23218
CONF-790615-	(3. US national congress on pressure vessels and piping, San Francisco, CA, USA, 25-29 Jun 1979)			
30	NTIS, PC A02/MF A01	DE83008415	MN -90d	8:22917
CONF-7911188-	(Fall technical meeting of the Eastern Section of the Combustion Institute, Atlanta, GA, USA, 7-9 Nov 1979)			
1	NTIS, PC A02/MF A01; 1	DE83008216	MN -90e	8:22994
CONF-8003176-	(Workshop on nuclear techniques in hydrology, Hyderabad, India, 19-21 Mar 1980)			
	NTIS (US Sales Only), PC A14; 3	DE82904743	ND -11	8:24483
CONF-800814-	(180. American Chemical Society meeting/2. chemical congress of the North American Continent, Las Vegas, NV, USA, 24-29 Aug 1980)			
34	NTIS, PC A02; 3	DE81903609	ND -61a	8:23263
CONF-800879-	(ISMAR-AMPERE conference, Delft, Netherlands, Aug 1980)			
2	NTIS, PC A02/MF A01	DE83008536	MN -48	8:24348
CONF-8009307-	(Workshop on industry perspectives on pioneer process plants, Washington, DC, USA, 17 Sep 1980)			
Exc.	*See* RAND/N-1709-DOE	DE83008161	MN -13	8:23750
CONF-8010319-	(Integrated lake-watershed acidification annual review conference, Sagamore Lake, NY, USA, 8-10 Oct 1980)			
	See EPRI-EA-2827	DE83901460	MN -11	8:24280
CONF-8010322-	(NATO school on superionic conductors, Odense, Norway, 1 Oct 1980)			
1	NTIS, PC A04/MF A01	DE83008539	MN -34	8:24031
CONF-801165-	(IAEA advisory group specialist meeting on spent fuel storage alternatives, Las Vegas, NV, USA, 17-21 Nov 1980)			
1	*See* DP-MS-80-115	DE83009413	MN -85	8:23116
CONF-810106-	(19. Aerospace Sciences meeting, St Louis, MO, USA, 12-15 Jan 1981)			
5	NTIS, PC A02/MF A01; 1	DE83008647	MN -90g	8:23767
6	NTIS, PC A02/MF A01; 1	DE83008620	MN -93	8:23768
7	NTIS, PC A02/MF A01; 1	DE83008614	MN -90g	8:23769
8	NTIS, PC A02/MF A01; 1	DE83008615	MN -90g	8:23770
CONF-810107-	(2. international conference on recent progress in many-body theories, Mexico City, Mexico, 12-16 Jan 1981)			
7	NTIS, PC A02/MF A01; 1	DE83008525	MN -34D	8:24703
CONF-810109-	(Bat-Sheva seminar on molecular ions, molecular structure and interaction with matter, Rehovot, Israel, 4-11 Jan 1981)			
2	NTIS, PC A02/MF A01; 1	DE83008740	MN -34A	8:24514

Report No.	Availability	Order No.	Distribution Category	Abstract No.
3	NTIS, PC A02/MF A01; 1	DE83008741	MN -34A	8:24515
4	NTIS, PC A03/MF A01; 1	DE83008742	MN -34A	8:24516
CONF-810115-	(Nuclear and particle physics at energies up to 31 GeV: new and future aspects conference, Los Alamos, NM, USA, 5-8 Jan 1981)			
	See LA-8775-C	DE83006219	STD -34	8:24578
CONF-810153-	(2. special symposium on natural radiation environment, Bombay, India, 19-23 Jan 1981)			
4	NTIS, PC A02/MF A01; 1	DE83008616	MN -48	8:24362
CONF-810203-	(110. AIME annual meeting, Chicago, IL, USA, 22-26 Feb 1981)			
18	NTIS, PC A02/MF A01	DE83007792	MN -13	8:23685
CONF-810233-	(3. Pacific Basin conference, Acapulco, Mexico, 16-18 Feb 1981)			
2	NTIS, PC A03/MF A01; 1	DE83008619	MN -80	8:23575
CONF-810296-	(Meeting on conservation of historic stone buildings and monuments, Washington, DC, USA, 2-4 Feb 1981)			
1	NTIS, PC A02/MF A01	DE83008646	MN -11	8:24230
CONF-810319-	(3. symposium on the transfer and utilization of particulate control technology, Orlando, FL, USA, 9-12 Mar 1981)			
4	NTIS, PC A02/MF A01	DE83008221	MN -90i	8:22945
CONF-810340-	(7. international conference on magnet technology, Karlsruhe, F.R. Germany, 30 Mar-3 Apr 1981)			
	IEEE Trans. Magn., MAG-17: No. 5, 2190-2193(Sep 1981)			8:23777
	IEEE Trans. Magn., MAG-17: No. 5, 2308-2311(Sep 1981)			8:23778
	IEEE Trans. Magn., MAG-17: No. 5, 1966-1969(Sep 1981)			8:23779
	IEEE Trans. Magn., MAG-17: No. 5, 2015-2018(Sep 1981)			8:23780
	IEEE Trans. Magn., MAG-17: No. 5, 1571-1574(Sep 1981)			8:24117
	IEEE Trans. Magn., MAG-17: No. 5, 1645-1648(Sep 1981)			8:24118
	IEEE Trans. Magn., MAG-17: No. 5, 1730-1733(Sep 1981)			8:24119
	IEEE Trans. Magn., MAG-17: No. 5, 1761-1763(Sep 1981)			8:24120
	IEEE Trans. Magn., MAG-17: No. 5, 1764-1767(Sep 1981)			8:24121
	IEEE Trans. Magn., MAG-17: No. 5, 1793-1798(Sep 1981)			8:24122
	IEEE Trans. Magn., MAG-17: No. 5, 1803-1806(Sep 1981)			8:24123
	IEEE Trans. Magn., MAG-17: No. 5, 2019-2023(Sep 1981)			8:24124
	IEEE Trans. Magn., MAG-17: No. 5, 2238-2241(Sep 1981)			8:24125
	IEEE Trans. Magn., MAG-17: No. 5, 2250-2253(Sep 1981)			8:24126
	IEEE Trans. Magn., MAG-17: No. 5, 2316-2319(Sep 1981)			8:24127
	IEEE Trans. Magn., MAG-17: No. 5, 2343-2354(Sep 1981)			8:24128
	IEEE Trans. Magn., MAG-17: No. 5, 2144-2145(Sep 1981)			8:24193
CONF-810347-	(NACE international conference on high temperature corrosion, San Diego, CA, USA, 2-6 Mar 1981)			
6	NTIS, PC A03/MF A01; 1	DE83007592	MN -25	8:23995
CONF-8103155-	(17. meeting on municipal composts and food quality, Speyer, F.R. Germany, 26-27 Mar 1981)			
	NTIS (US Sales Only), PC A06/MF A01	DE83901012	MN -48	8:24405
CONF-8103159-	(Coal testing conference, Lexington, KY, USA, 2-3 Mar 1981)			
1	NTIS, PC A02/MF A01; 1	DE83008437	MN -90e	8:22995
CONF-8103162-	(Midwest region energy conference, Dearborn, MI, USA, 17-18 Mar 1981)			
1	NTIS, PC A02/MF A01	DE83008526	MN -13	8:23686
CONF-8103163-	(NATO Advanced Institute conference on non-linear phenomena and phase transitions, Geilo, Norway, 29 Mar-8 Apr 1981)			
2	NTIS, PC A02/MF A01	DE83008629	MN -34A	8:24520
CONF-810402-	(Corrosion/81 annual meeting, Toronto, Canada, 6-10 Apr 1981)			
14	NTIS, PC A02/MF A01; 1	DE83008511	MN -59c	8:23315
CONF-810432-	(Atomic physic program contractors' workshop, Argonne, IL, USA, 1-2 Apr 1981)			
5	NTIS, PC A02/MF A01	DE83007795	MN -34A	8:24517
CONF-810488-	(International symposium on energy and ecological modelling, Louisville, KY, USA, 20-23 Apr 1981)			
7	NTIS MF A01; 2	DE83008627	MN -11	8:24400
CONF-810497-	(International symposium on metal-hydrogen systems, Miami Beach, FL, USA, 13-15 Apr 1981)			
4	NTIS, PC A02/MF A01; 1	DE83007754	MN -25	8:23214
5	NTIS, PC A02/MF A01; 1	DE83007764	MN -25	8:23215
CONF-8104153-	(National Council for Radiation Protection symposium on control of radiation exposures, Washington, DC, USA, 27-29 Apr 1981)			
4	NTIS, PC A02/MF A01	DE83008628	MN -48	8:24363
CONF-8104192-	(Forum on fuel cell and secondary batteries for load leveling, Tokyo, Japan, 13-14 Apr 1981)			
2	NTIS, PC A02/MF A01	DE83007752	MN -94cb	8:23408
3	NTIS, PC A02/MF A01	DE83007751	MN -94ca	8:23885
CONF-8104197-	(NRC workshop on advanced intake technology, San Diego, CA, USA, 22-24 Apr 1981)			
1	NTIS, PC A02/MF A01	DE83008652	MN -12	8:23409
CONF-8104198-	(American Planning Association conference on national planning, Boston, MA, USA, 24-29 Apr 1981)			
1	NTIS, PC A02/MF A01; 1	DE83008653	MN -98	8:23754

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-810503-	(35. annual quality congress and exposition, San Francisco, CA, USA, 27-29 May 1981)			
	Trans. Annu. Tech. Conf., Am. Soc. Qual. Control, 138-144(1981)			8:24482
CONF-810507-	(Society for Experimental Stress Analysis meeting, Dearborn, MI, USA, 31 May-5 Jun 1981)			
2	NTIS, PC A02/MF A01; 1	DE83008626	MN -80	8:23541
CONF-810523-	(Topical conference on computerized data acquisition in particle and nuclear physics, Oak Ridge, TN, USA, 28-30 May 1981)			
19	NTIS, PC A02/MF A01; 1	DE83008600	MN -34D	8:24172
CONF-810545-	(3. conference on waste heat management and utilization, Miami, FL, USA, 12 May 1981)			
7	NTIS MF A01; 2	DE83008512	MN -11	8:24252
8	NTIS, PC A02/MF A01; 1	DE83008514	MN -78	8:23573
9	NTIS MF A01; 2	DE83008522	MN -12	8:24401
10	NTIS, PC A02/MF A01; 1	DE83008601	MN -12	8:24157
11	NTIS, PC A02/MF A01	DE83008744	MN -95f	8:23856
CONF-810546-	(1981 spring DECUS U.S. symposium, Miami Beach, FL, USA, 18-21 May 1981)			
5	NTIS, PC A02/MF A01; 1	DE83008516	MN -32	8:25266
CONF-810566-	(International conference on fast ionic transport in solids, Gatlinburg, TN, USA, 18-22 May 1981)			
12	NTIS, PC A02/MF A01	DE83008501	MN -38	8:24029
CONF-810574-	(International Association of Science and Technology for Development energy symposium, San Francisco, CA, USA, 20-22 May 1981)			
2	NTIS, PC A02/MF A01; 1	DE83008515	MN -90g	8:23771
3	NTIS, PC A02/MF A01; 1	DE83008513	MN -11	8:23696
CONF-810581-	(Powder and bulk solids conference, Chicago, IL, USA, 12-14 May 1981)			
3	NTIS, PC A02/MF A01	DE83008602	MN -90e	8:24149
CONF-810625-	(ASME PVP conference, Denver, CO, USA, 21-26 Jun 1981)			
23	NTIS, PC A02/MF A01; 1	DE83008510	MN -80	8:23469
CONF-810631-	(74. annual meeting of the Air Pollution Control Association, Philadelphia, PA, USA, 21-26 Jun 1981)			
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:23830
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:23831
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:23832
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:23833
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:23867
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:24226
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:24254
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:24306
8	NTIS, PC A02/MF A01; 1	DE83007694	MN -11	8:24402
CONF-810657-	(ASHRAE 1981 annual meeting, Cincinnati, OH, USA, 28 Jun-2 Jul 1981)			
	ASHRAE Trans., 631-647(1981)			8:23349
	ASHRAE Trans., 87: 797-994(1981)			8:23386
	ASHRAE Trans., 87: 1005-1014(1981)			8:23387
	ASHRAE Trans., 87: 89-107(1981)			8:23834
	ASHRAE Trans., 87: 251-261(1981)			8:23835
	ASHRAE Trans., 87: 435-448(1981)			8:23836
	ASHRAE Trans., 87: 539-544(1981)			8:23837
	ASHRAE Trans., 87: 195-213(1981)			8:23838
	ASHRAE Trans., 87: 743-756(1981)			8:23839
	ASHRAE Trans., 87: 757-770(1981)			8:23840
CONF-8106164-	(National Bureau of Standards joint conferences: 8. symposium on thermophysical properties; 17. thermal conductivity conference; 8. thermal expansion conference, Gaithersburg, MD, USA, 15-18 Jun 1981)			
5	NTIS, PC A03/MF A01	DE83008655	MN -79a	8:23516
CONF-8106251-	(15. annual conference on trace substances in environmental health, Columbia, MO, USA, 1-4 Jun 1981)			
	Trace Subst. Environ. Health, 15: 350-355(Jun 1981)			8:24245
	Trace Subst. Environ. Health, 15: 406-418(Jun 1981)			8:24246
	Trace Subst. Environ. Health, 15: 317-322(Jun 1981)			8:24259
	Trace Subst. Environ. Health, 15: 323-332(Jun 1981)			8:24260
	Trace Subst. Environ. Health, 15: 356-365(Jun 1981)			8:24292
	Trace Subst. Environ. Health, 15: 69-77(Jun 1981)			8:24296
	Trace Subst. Environ. Health, 15: 78-85(Jun 1981)			8:24297
	Trace Subst. Environ. Health, 15: 87-95(Jun 1981)			8:24298
	Trace Subst. Environ. Health, 15: 96-103(Jun 1981)			8:24299
	Trace Subst. Environ. Health, 15: 171-177(Jun 1981)			8:24300
	Trace Subst. Environ. Health, 15: 226-232(Jun 1981)			8:24323
	Trace Subst. Environ. Health, 15: 308-314(Jun 1981)			8:24324
	Trace Subst. Environ. Health, 15: 121-130(Jun 1981)			8:24345
	Trace Subst. Environ. Health, 15: 64-68(Jun 1981)			8:24353
	Trace Subst. Environ. Health, 15: 3-20(Jun 1981)			8:24457
	Trace Subst. Environ. Health, 15: 23-28(Jun 1981)			8:24458
	Trace Subst. Environ. Health, 15: 29-34(Jun 1981)			8:24459
	Trace Subst. Environ. Health, 15: 25-44(Jun 1981)			8:24460
	Trace Subst. Environ. Health, 15: 45-53(Jun 1981)			8:24461
	Trace Subst. Environ. Health, 15: 54-60(Jun 1981)			8:24462

Report No.	Availability	Order No.	Distribution Category	Abstract No.
	Trace Subst. Environ. Health, 15: 104-110(Jun 1981)			8:24463
	Trace Subst. Environ. Health, 15: 113-120(Jun 1981)			8:24464
	Trace Subst. Environ. Health, 15: 131-143(Jun 1981)			8:24465
	Trace Subst. Environ. Health, 15: 144-153(Jun 1981)			8:24466
	Trace Subst. Environ. Health, 15: 154-159(Jun 1981)			8:24467
	Trace Subst. Environ. Health, 15: 166-170(Jun 1981)			8:24468
	Trace Subst. Environ. Health, 15: 178-183(Jun 1981)			8:24469
	Trace Subst. Environ. Health, 15: 184-189(Jun 1981)			8:24470
	Trace Subst. Environ. Health, 15: 190-197(Jun 1981)			8:24471
	Trace Subst. Environ. Health, 15: 198-207(Jun 1981)			8:24472
	Trace Subst. Environ. Health, 15: 270-278(Jun 1981)			8:24473
	Trace Subst. Environ. Health, 15: 366-371(Jun 1981)			8:24474
	Trace Subst. Environ. Health, 15: 372-382(Jun 1981)			8:24475
CONF-810736-	(Meeting on glass structures: surface and bulk, University Park, PA, USA, 28-31 Jul 1981)			
3	NTIS, PC A02/MF A01	DE83007889	MN -25	8:24030
CONF-810740-	(3. analytical electron microscopy workshop, Vail, CO, USA, 13-17 Jul 1981)			
3	NTIS, PC A02/MF A01	DE83007907	MN -80	8:24046
CONF-810748-	(Commercial photovoltaics measurements workshop, Vail, CO, USA, 27-29 Jul 1981)			
3	*See* DOE/ET/20279-156	DE82000663	MN -63	8:23265
CONF-810756-	(International school of physics position in solids conference, Lake Como, Italy, 14-24 Jul 1981)			
4	NTIS, PC A02/MF A01; 1	DE83007930	MN -25	8:23893
CONF-810758-	(Conference on physics of intercalation compounds, Trieste, Italy, 6-10 Jul 1981)			
2	*See* DOE/ER/01198-1363	DE81030939	MN -34	8:24032
CONF-810759-	(Physics opportunities at ISABELLE summer workshop, Upton, NY, USA, 20-31 Jul 1981)			
2	*See* DOE/ER/40033-9	DE82000665	MN -34D	8:24196
CONF-810760-	(International conference on high energy physics, Lisbon, Portugal, 9-15 Jul 1981)			
2	*See* DOE/ER/40033-8	DE82000593	MN -34D	8:24577
CONF-810809-	(16. international conference on low temperature physics, Los Angeles, CA, USA, 19-25 Aug 1981)			
30	NTIS, PC A02/MF A01	DE83007804	MN -25	8:23894
31	NTIS, PC A02/MF A01; 1	DE83008527	MN -34	8:24570
32	NTIS, PC A02/MF A01	DE83008507	MN -25	8:23996
CONF-810812-	(IECEC conference, Atlanta, GA, USA, 9-14 Aug 1981)			
48	NTIS, PC A02/MF A01; 1	DE83007908	MN -80	8:24819
CONF-810814-	(91. national meeting of the American Institute of Chemical Engineers, Detroit, MI, USA, 16-19 Aug 1981)			
13	NTIS, PC A02/MF A01	DE83008224	MN -90b	8:22983
CONF-810831-	(Fusion reactor materials meeting, Seattle, WA, USA, 9-12 Aug 1981)			
59	*See* DOE/ET/52048-19	DE82000907	STD -20	8:24827
103	NTIS, PC A02/MF A01; 1	DE83007942	MN -20c	8:24820
CONF-810833-	(Mechanical, magnetic, and underground energy storage 1981 annual contractors' review meeting, Washington, DC, USA, 24-26 Aug 1981)			
10	*See* DOE/ET/20279-157	DE82000664	MN -94b	8:23662
CONF-810842-	(American Statistical Association meeting, Detroit, MI, USA, 10-13 Aug 1981)			
9	NTIS, PC A02/MF A01; 1	DE83007835	MN -80	8:23728
CONF-810860-	(ASM international conference on solid-solid phase transformations, Pittsburgh, PA, USA, 10-14 Aug 1981)			
12	NTIS, PC A02/MF A01	DE83007888	MN -34	8:24056
CONF-810866-	(NATO advanced study institute on excitations in disordered systems, E Lansing, MI, USA, 23 Aug-4 Sep 1981)			
2	*See* LBL-13220	DE82000277	MN -34A	8:24741
CONF-810868-	(6. international conference on fast ion beam spectroscopy, Quebec, Canada, 17-20 Aug 1981)			
6	NTIS, PC A02/MF A01; 1	DE83007931	MN -34A	8:24518
CONF-810874-	(8. international colloquium on gasdynamics of explosions and reactive systems, Minsk, USSR, 23-26 Aug 1981)			
2	*See* LA-UR-81-2737	DE82000564	MN -45	8:24212
CONF-810905-	(ANS/ENS topical meeting on probabilistic risk assessment, Post Chester, NY, USA, 20-24 Sep 1981)			
41	NTIS, PC A02/MF A01	DE83008505	MN -79p	8:23586
CONF-810913-	(International conference on environmental degradation of engineering materials, Blacksburg, VA, USA, 21-23 Sep 1981)			
Vol.1	Virginia Polytechnic Institute, Laboratory for the Study of Environmental Degradation of Engineering Materials, 201 Holden Hall, Blacksburg, VA 24061		ND -38	8:23895
CONF-810944-	(9. international conference on cyclotrons and their applications, Caen, France, 7-10 Sep 1981)			
11	*See* LA-UR-81-2661	DE82000588	MN -28	8:24168
CONF-810971-	(Specialists' meeting on radioiodine management, Brussels, Belgium, 25 Sep 1981)			
1	*See* PNL-SA-9829	DE81030297	MN -70	8:23165
CONF-8109202-	(1. international symposium on coal, Ixtapa, Mexico, 7-9 Sep 1981)			
	See ICTIS/M-0148			8:22932

Report No.	Availability	Order No.	Distribution Category	Abstract No.
	See ICTIS/M-0149			8:22933
	See ICTIS/M-0150			8:22934
	See ICTIS/M-0146			8:22942
	See ICTIS/M-0147			8:22956
	See ICTIS/M-0144			8:22989
	See ICTIS/M-0145			8:22990
CONF-8109207-	(ATA non-destructive testing forum, Phoenix, AZ, USA, 1-3 Sep 1981)			
1	*See* PNL-SA-9511	DE83007573	MN -25	8:24142
CONF-811012-	(IEEE symposium on nuclear science, San Francisco, CA, USA, 21-23 Oct 1981)			
67	NTIS, PC A02/MF A01; 1	DE83008608	MN -34D	8:24173
CONF-811023-	(1981 SPE annual technical conference and exhibition, San Antonio, TX, USA, 4-7 Oct 1981)			
	Soc. Pet. Eng. AIME, Pap., 1-10(1981)			8:22940
	Soc. Pet. Eng. AIME, Pap., 1-7(1981)			8:23015
	Soc. Pet. Eng. AIME, Pap., 1-7(1981)			8:23027
	Soc. Pet. Eng. AIME, Pap., 1-10(1981)			8:23028
CONF-811040-	(9. symposium on engineering problems of fusion research, Chicago, IL, USA, 26-29 Oct 1981)			
	Proc. Symp. Eng. Probl. Fusion Res., 1732-1734(1981)			8:23213
	Proc. Symp. Eng. Probl. Fusion Res., 1326-1329(1981)			8:24129
	Proc. Symp. Eng. Probl. Fusion Res., 1729-1731(1981)			8:24164
	Proc. Symp. Eng. Probl. Fusion Res., 806(1981)			8:24809
	Proc. Symp. Eng. Probl. Fusion Res., 960(1981)			8:24810
	Proc. Symp. Eng. Probl. Fusion Res., 1923(1981)			8:24811
	Proc. Symp. Eng. Probl. Fusion Res., 1684-1687(1981)			8:24812
	Proc. Symp. Eng. Probl. Fusion Res., 475-478(1981)			8:24813
	Proc. Symp. Eng. Probl. Fusion Res., 715-718(1981)			8:24814
	Proc. Symp. Eng. Probl. Fusion Res., 1717-1720(1981)			8:24815
	Proc. Symp. Eng. Probl. Fusion Res., 162-165(1981)			8:24918
	Proc. Symp. Eng. Probl. Fusion Res., 339-341(1981)			8:24919
	Proc. Symp. Eng. Probl. Fusion Res., 668-671(1981)			8:24920
	Proc. Symp. Eng. Probl. Fusion Res., 949(1981)			8:24921
	Proc. Symp. Eng. Probl. Fusion Res., 1410-1413(1981)			8:24922
	Proc. Symp. Eng. Probl. Fusion Res., 1705-1708(1981)			8:24923
	Proc. Symp. Eng. Probl. Fusion Res., 1909-1911(1981)			8:24924
	Proc. Symp. Eng. Probl. Fusion Res., 2113-2117(1981)			8:24925
	Proc. Symp. Eng. Probl. Fusion Res., 835-838(1981)			8:24926
	Proc. Symp. Eng. Probl. Fusion Res., 1641-1644(1981)			8:24927
	Proc. Symp. Eng. Probl. Fusion Res., 1490-1493(1981)			8:24928
	Proc. Symp. Eng. Probl. Fusion Res., 1839-1842(1981)			8:24929
	Proc. Symp. Eng. Probl. Fusion Res., 1847-1850(1981)			8:24930
	Proc. Symp. Eng. Probl. Fusion Res., 1851-1854(1981)			8:24931
	Proc. Symp. Eng. Probl. Fusion Res., 1863-1866(1981)			8:24932
	Proc. Symp. Eng. Probl. Fusion Res., 1867-1870(1981)			8:24933
	Proc. Symp. Eng. Probl. Fusion Res., 1871-1874(1981)			8:24934
	Proc. Symp. Eng. Probl. Fusion Res., 1880-1883(1981)			8:24935
	Proc. Symp. Eng. Probl. Fusion Res., 1884-1887(1981)			8:24936
	Proc. Symp. Eng. Probl. Fusion Res., 1888-1891(1981)			8:24937
	Proc. Symp. Eng. Probl. Fusion Res., 1892-1893(1981)			8:24938
	Proc. Symp. Eng. Probl. Fusion Res., 1894-1897(1981)			8:24939
	Proc. Symp. Eng. Probl. Fusion Res., 1898-1900(1981)			8:24940
	Proc. Symp. Eng. Probl. Fusion Res., 1929(1981)			8:24941
	Proc. Symp. Eng. Probl. Fusion Res., 1930(1981)			8:24942
	Proc. Symp. Eng. Probl. Fusion Res., 1931-1934(1981)			8:24943
	Proc. Symp. Eng. Probl. Fusion Res., 1935-1938(1981)			8:24944
	Proc. Symp. Eng. Probl. Fusion Res., 1939-1942(1981)			8:24945
	Proc. Symp. Eng. Probl. Fusion Res., 1943-1946(1981)			8:24946
	Proc. Symp. Eng. Probl. Fusion Res., 1947-1950(1981)			8:24947
	Proc. Symp. Eng. Probl. Fusion Res., 1951-1954(1981)			8:24948
	Proc. Symp. Eng. Probl. Fusion Res., 1955-1958(1981)			8:24949
	Proc. Symp. Eng. Probl. Fusion Res., 1959-1962(1981)			8:24950
	Proc. Symp. Eng. Probl. Fusion Res., 1976-1979(1981)			8:24951
	Proc. Symp. Eng. Probl. Fusion Res., 1984-1987(1981)			8:24952
	Proc. Symp. Eng. Probl. Fusion Res., 2043-2045(1981)			8:24953
	Proc. Symp. Eng. Probl. Fusion Res., 2126-2128(1981)			8:24954
	Proc. Symp. Eng. Probl. Fusion Res., 569-573(1981)			8:24955
	Proc. Symp. Eng. Probl. Fusion Res., 732-735(1981)			8:24956
	Proc. Symp. Eng. Probl. Fusion Res., 736-739(1981)			8:24957
	Proc. Symp. Eng. Probl. Fusion Res., 1176-1178(1981)			8:24958
	Proc. Symp. Eng. Probl. Fusion Res., 1200-1204(1981)			8:24959
	Proc. Symp. Eng. Probl. Fusion Res., 1406-1409(1981)			8:24960
	Proc. Symp. Eng. Probl. Fusion Res., 1447-1450(1981)			8:24961
	Proc. Symp. Eng. Probl. Fusion Res., 1459-1462(1981)			8:24962
	Proc. Symp. Eng. Probl. Fusion Res., 1617-1620(1981)			8:24963
	Proc. Symp. Eng. Probl. Fusion Res., 1621-1625(1981)			8:24964
	Proc. Symp. Eng. Probl. Fusion Res., 1626-1629(1981)			8:24965
	Proc. Symp. Eng. Probl. Fusion Res., 1630-1632(1981)			8:24966
	Proc. Symp. Eng. Probl. Fusion Res., 1633-1636(1981)			8:24967
	Proc. Symp. Eng. Probl. Fusion Res., 1650-1653(1981)			8:24968
	Proc. Symp. Eng. Probl. Fusion Res., 1759-1762(1981)			8:24969
	Proc. Symp. Eng. Probl. Fusion Res., 1763-1766(1981)			8:24970
	Proc. Symp. Eng. Probl. Fusion Res., 1767-1770(1981)			8:24971
	Proc. Symp. Eng. Probl. Fusion Res., 1790-1793(1981)			8:24972

Report No.	Availability	Order No.	Distribution Category	Abstract No.
	Proc. Symp. Eng. Probl. Fusion Res., 1801-1804(1981)			8:24973
	Proc. Symp. Eng. Probl. Fusion Res., 1805-1808(1981)			8:24974
	Proc. Symp. Eng. Probl. Fusion Res., 1818-1821(1981)			8:24975
	Proc. Symp. Eng. Probl. Fusion Res., 1827-1830(1981)			8:24976
	Proc. Symp. Eng. Probl. Fusion Res., 1855-1858(1981)			8:24977
	Proc. Symp. Eng. Probl. Fusion Res., 1859-1862(1981)			8:24978
	Proc. Symp. Eng. Probl. Fusion Res., 1916-1919(1981)			8:24979
	Proc. Symp. Eng. Probl. Fusion Res., 1988-1991(1981)			8:24980
	Proc. Symp. Eng. Probl. Fusion Res., 1992-1995(1981)			8:24981
	Proc. Symp. Eng. Probl. Fusion Res., 2160(1981)			8:24982
	Proc. Symp. Eng. Probl. Fusion Res., 1-4(1981)			8:24983
	Proc. Symp. Eng. Probl. Fusion Res., 76-79(1981)			8:24984
	Proc. Symp. Eng. Probl. Fusion Res., 80-82(1981)			8:24985
	Proc. Symp. Eng. Probl. Fusion Res., 83-86(1981)			8:24986
	Proc. Symp. Eng. Probl. Fusion Res., 87-90(1981)			8:24987
	Proc. Symp. Eng. Probl. Fusion Res., 103-106(1981)			8:24988
	Proc. Symp. Eng. Probl. Fusion Res., 107-110(1981)			8:24989
	Proc. Symp. Eng. Probl. Fusion Res., 111-114(1981)			8:24990
	Proc. Symp. Eng. Probl. Fusion Res., 115-118(1981)			8:24991
	Proc. Symp. Eng. Probl. Fusion Res., 119-122(1981)			8:24992
	Proc. Symp. Eng. Probl. Fusion Res., 123-126(1981)			8:24993
	Proc. Symp. Eng. Probl. Fusion Res., 127-130(1981)			8:24994
	Proc. Symp. Eng. Probl. Fusion Res., 135-138(1981)			8:24995
	Proc. Symp. Eng. Probl. Fusion Res., 146-149(1981)			8:24996
	Proc. Symp. Eng. Probl. Fusion Res., 150-153(1981)			8:24997
	Proc. Symp. Eng. Probl. Fusion Res., 158-161(1981)			8:24998
	Proc. Symp. Eng. Probl. Fusion Res., 170-173(1981)			8:24999
	Proc. Symp. Eng. Probl. Fusion Res., 174-177(1981)			8:25000
	Proc. Symp. Eng. Probl. Fusion Res., 178-181(1981)			8:25001
	Proc. Symp. Eng. Probl. Fusion Res., 182-184(1981)			8:25002
	Proc. Symp. Eng. Probl. Fusion Res., 189-192(1981)			8:25003
	Proc. Symp. Eng. Probl. Fusion Res., 193-196(1981)			8:25004
	Proc. Symp. Eng. Probl. Fusion Res., 199-202(1981)			8:25005
	Proc. Symp. Eng. Probl. Fusion Res., 203-206(1981)			8:25006
	Proc. Symp. Eng. Probl. Fusion Res., 208-211(1981)			8:25007
	Proc. Symp. Eng. Probl. Fusion Res., 213-215(1981)			8:25008
	Proc. Symp. Eng. Probl. Fusion Res., 260-264(1981)			8:25009
	Proc. Symp. Eng. Probl. Fusion Res., 273-276(1981)			8:25010
	Proc. Symp. Eng. Probl. Fusion Res., 277-280(1981)			8:25011
	Proc. Symp. Eng. Probl. Fusion Res., 281-284(1981)			8:25012
	Proc. Symp. Eng. Probl. Fusion Res., 293-296(1981)			8:25013
	Proc. Symp. Eng. Probl. Fusion Res., 297-300(1981)			8:25014
	Proc. Symp. Eng. Probl. Fusion Res., 301-304(1981)			8:25015
	Proc. Symp. Eng. Probl. Fusion Res., 309-312(1981)			8:25016
	Proc. Symp. Eng. Probl. Fusion Res., 316-319(1981)			8:25017
	Proc. Symp. Eng. Probl. Fusion Res., 320-323(1981)			8:25018
	Proc. Symp. Eng. Probl. Fusion Res., 324-327(1981)			8:25019
	Proc. Symp. Eng. Probl. Fusion Res., 330-334(1981)			8:25020
	Proc. Symp. Eng. Probl. Fusion Res., 335-338(1981)			8:25021
	Proc. Symp. Eng. Probl. Fusion Res., 342-345(1981)			8:25022
	Proc. Symp. Eng. Probl. Fusion Res., 346-349(1981)			8:25023
	Proc. Symp. Eng. Probl. Fusion Res., 354-357(1981)			8:25024
	Proc. Symp. Eng. Probl. Fusion Res., 358-361(1981)			8:25025
	Proc. Symp. Eng. Probl. Fusion Res., 362-365(1981)			8:25026
	Proc. Symp. Eng. Probl. Fusion Res., 366-369(1981)			8:25027
	Proc. Symp. Eng. Probl. Fusion Res., 370-373(1981)			8:25028
	Proc. Symp. Eng. Probl. Fusion Res., 411-415(1981)			8:25029
	Proc. Symp. Eng. Probl. Fusion Res., 456-459(1981)			8:25030
	Proc. Symp. Eng. Probl. Fusion Res., 467-470(1981)			8:25031
	Proc. Symp. Eng. Probl. Fusion Res., 519-522(1981)			8:25032
	Proc. Symp. Eng. Probl. Fusion Res., 523-527(1981)			8:25033
	Proc. Symp. Eng. Probl. Fusion Res., 535-538(1981)			8:25034
	Proc. Symp. Eng. Probl. Fusion Res., 539-542(1981)			8:25035
	Proc. Symp. Eng. Probl. Fusion Res., 547-551(1981)			8:25036
	Proc. Symp. Eng. Probl. Fusion Res., 556-559(1981)			8:25037
	Proc. Symp. Eng. Probl. Fusion Res., 564-568(1981)			8:25038
	Proc. Symp. Eng. Probl. Fusion Res., 582-585(1981)			8:25039
	Proc. Symp. Eng. Probl. Fusion Res., 623-626(1981)			8:25040
	Proc. Symp. Eng. Probl. Fusion Res., 627-630(1981)			8:25041
	Proc. Symp. Eng. Probl. Fusion Res., 631-634(1981)			8:25042
	Proc. Symp. Eng. Probl. Fusion Res., 635-639(1981)			8:25043
	Proc. Symp. Eng. Probl. Fusion Res., 644-647(1981)			8:25044
	Proc. Symp. Eng. Probl. Fusion Res., 648-651(1981)			8:25045
	Proc. Symp. Eng. Probl. Fusion Res., 756-759(1981)			8:25046
	Proc. Symp. Eng. Probl. Fusion Res., 1150-1153(1981)			8:25047
	Proc. Symp. Eng. Probl. Fusion Res., 1330-1332(1981)			8:25048
	Proc. Symp. Eng. Probl. Fusion Res., 1333-1336(1981)			8:25049
	Proc. Symp. Eng. Probl. Fusion Res., 1451-1454(1981)			8:25050
	Proc. Symp. Eng. Probl. Fusion Res., 2012-2015(1981)			8:25051
	Proc. Symp. Eng. Probl. Fusion Res., 2016-2018(1981)			8:25052
	Proc. Symp. Eng. Probl. Fusion Res., 2019-2022(1981)			8:25053
	Proc. Symp. Eng. Probl. Fusion Res., 2023-2026(1981)			8:25054
	Proc. Symp. Eng. Probl. Fusion Res., 2027-2030(1981)			8:25055
	Proc. Symp. Eng. Probl. Fusion Res., 2031-2034(1981)			8:25056
	Proc. Symp. Eng. Probl. Fusion Res., 2035-2038(1981)			8:25057

Report No.	Availability	Order No.	Distribution Category	Abstract No.
	Proc. Symp. Eng. Probl. Fusion Res., 2039-2042(1981)			8:25058
	Proc. Symp. Eng. Probl. Fusion Res., 378-381(1981)			8:25059
	Proc. Symp. Eng. Probl. Fusion Res., 382-385(1981)			8:25060
	Proc. Symp. Eng. Probl. Fusion Res., 386-389(1981)			8:25061
	Proc. Symp. Eng. Probl. Fusion Res., 390-393(1981)			8:25062
	Proc. Symp. Eng. Probl. Fusion Res., 394-398(1981)			8:25063
	Proc. Symp. Eng. Probl. Fusion Res., 399-402(1981)			8:25064
	Proc. Symp. Eng. Probl. Fusion Res., 403-406(1981)			8:25065
	Proc. Symp. Eng. Probl. Fusion Res., 423-426(1981)			8:25066
	Proc. Symp. Eng. Probl. Fusion Res., 431-434(1981)			8:25067
	Proc. Symp. Eng. Probl. Fusion Res., 438-441(1981)			8:25068
	Proc. Symp. Eng. Probl. Fusion Res., 442-443(1981)			8:25069
	Proc. Symp. Eng. Probl. Fusion Res., 460-462(1981)			8:25070
	Proc. Symp. Eng. Probl. Fusion Res., 752-755(1981)			8:25071
	Proc. Symp. Eng. Probl. Fusion Res., 868-871(1981)			8:25072
	Proc. Symp. Eng. Probl. Fusion Res., 958-959(1981)			8:25073
	Proc. Symp. Eng. Probl. Fusion Res., 1414-1417(1981)			8:25074
	Proc. Symp. Eng. Probl. Fusion Res., 1427-1430(1981)			8:25075
	Proc. Symp. Eng. Probl. Fusion Res., 1431-1434(1981)			8:25076
	Proc. Symp. Eng. Probl. Fusion Res., 1438-1441(1981)			8:25077
	Proc. Symp. Eng. Probl. Fusion Res., 72-75(1981)			8:25078
	Proc. Symp. Eng. Probl. Fusion Res., 708-711(1981)			8:25079
	Proc. Symp. Eng. Probl. Fusion Res., 712-714(1981)			8:25080
	Proc. Symp. Eng. Probl. Fusion Res., 760-762(1981)			8:25081
	Proc. Symp. Eng. Probl. Fusion Res., 767-770(1981)			8:25082
	Proc. Symp. Eng. Probl. Fusion Res., 779-782(1981)			8:25083
	Proc. Symp. Eng. Probl. Fusion Res., 783-786(1981)			8:25084
	Proc. Symp. Eng. Probl. Fusion Res., 787-790(1981)			8:25085
	Proc. Symp. Eng. Probl. Fusion Res., 791-794(1981)			8:25086
	Proc. Symp. Eng. Probl. Fusion Res., 795-797(1981)			8:25087
	Proc. Symp. Eng. Probl. Fusion Res., 802-805(1981)			8:25088
	Proc. Symp. Eng. Probl. Fusion Res., 811-814(1981)			8:25089
	Proc. Symp. Eng. Probl. Fusion Res., 815-818(1981)			8:25090
	Proc. Symp. Eng. Probl. Fusion Res., 819-822(1981)			8:25091
	Proc. Symp. Eng. Probl. Fusion Res., 826(1981)			8:25092
	Proc. Symp. Eng. Probl. Fusion Res., 831-834(1981)			8:25093
	Proc. Symp. Eng. Probl. Fusion Res., 839-843(1981)			8:25094
	Proc. Symp. Eng. Probl. Fusion Res., 844-847(1981)			8:25095
	Proc. Symp. Eng. Probl. Fusion Res., 848-850(1981)			8:25096
	Proc. Symp. Eng. Probl. Fusion Res., 851-854(1981)			8:25097
	Proc. Symp. Eng. Probl. Fusion Res., 855-857(1981)			8:25098
	Proc. Symp. Eng. Probl. Fusion Res., 859-863(1981)			8:25099
	Proc. Symp. Eng. Probl. Fusion Res., 864-867(1981)			8:25100
	Proc. Symp. Eng. Probl. Fusion Res., 872-875(1981)			8:25101
	Proc. Symp. Eng. Probl. Fusion Res., 912-915(1981)			8:25102
	Proc. Symp. Eng. Probl. Fusion Res., 920-923(1981)			8:25103
	Proc. Symp. Eng. Probl. Fusion Res., 941-944(1981)			8:25104
	Proc. Symp. Eng. Probl. Fusion Res., 945-948(1981)			8:25105
	Proc. Symp. Eng. Probl. Fusion Res., 1040-1043(1981)			8:25106
	Proc. Symp. Eng. Probl. Fusion Res., 1337(1981)			8:25107
	Proc. Symp. Eng. Probl. Fusion Res., 1338-1341(1981)			8:25108
	Proc. Symp. Eng. Probl. Fusion Res., 1342-1346(1981)			8:25109
	Proc. Symp. Eng. Probl. Fusion Res., 1347-1351(1981)			8:25110
	Proc. Symp. Eng. Probl. Fusion Res., 1352-1355(1981)			8:25111
	Proc. Symp. Eng. Probl. Fusion Res., 1356-1359(1981)			8:25112
	Proc. Symp. Eng. Probl. Fusion Res., 1519-1521(1981)			8:25113
	Proc. Symp. Eng. Probl. Fusion Res., 1530-1533(1981)			8:25114
	Proc. Symp. Eng. Probl. Fusion Res., 1534-1537(1981)			8:25115
	Proc. Symp. Eng. Probl. Fusion Res., 1546-1547(1981)			8:25116
	Proc. Symp. Eng. Probl. Fusion Res., 1609-1612(1981)			8:25117
	Proc. Symp. Eng. Probl. Fusion Res., 1721-1724(1981)			8:25118
	Proc. Symp. Eng. Probl. Fusion Res., 1725-1728(1981)			8:25119
	Proc. Symp. Eng. Probl. Fusion Res., 2101-2104(1981)			8:25120
	Proc. Symp. Eng. Probl. Fusion Res., 2105-2108(1981)			8:25121
	Proc. Symp. Eng. Probl. Fusion Res., 2109-2112(1981)			8:25122
	Proc. Symp. Eng. Probl. Fusion Res., 2122-2125(1981)			8:25123
	Proc. Symp. Eng. Probl. Fusion Res., 1165-1168(1981)			8:25124
	Proc. Symp. Eng. Probl. Fusion Res., 1169-1172(1981)			8:25125
	Proc. Symp. Eng. Probl. Fusion Res., 1196-1199(1981)			8:25126
	Proc. Symp. Eng. Probl. Fusion Res., 1213-1216(1981)			8:25127
	Proc. Symp. Eng. Probl. Fusion Res., 1402-1405(1981)			8:25128
	Proc. Symp. Eng. Probl. Fusion Res., 2066(1981)			8:25129
	Proc. Symp. Eng. Probl. Fusion Res., 2084-2087(1981)			8:25130
	Proc. Symp. Eng. Probl. Fusion Res., 2094-2097(1981)			8:25131
	Proc. Symp. Eng. Probl. Fusion Res., 950-953(1981)			8:25132
	Proc. Symp. Eng. Probl. Fusion Res., 1435-1437(1981)			8:25133
	Proc. Symp. Eng. Probl. Fusion Res., 1813-1816(1981)			8:25134
	Proc. Symp. Eng. Probl. Fusion Res., 660-663(1981)			8:25135
	Proc. Symp. Eng. Probl. Fusion Res., 664-667(1981)			8:25136
	Proc. Symp. Eng. Probl. Fusion Res., 673-675(1981)			8:25137
	Proc. Symp. Eng. Probl. Fusion Res., 680-683(1981)			8:25138
	Proc. Symp. Eng. Probl. Fusion Res., 684-687(1981)			8:25139
	Proc. Symp. Eng. Probl. Fusion Res., 1221-1224(1981)			8:25140
	Proc. Symp. Eng. Probl. Fusion Res., 1225-1228(1981)			8:25141
	Proc. Symp. Eng. Probl. Fusion Res., 1229-1233(1981)			8:25142

Report No.	Availability	Order No.	Distribution Category	Abstract No.
	Proc. Symp. Eng. Probl. Fusion Res., 1234-1237(1981)			8:25143
	Proc. Symp. Eng. Probl. Fusion Res., 1238-1240(1981)			8:25144
	Proc. Symp. Eng. Probl. Fusion Res., 1241-1243(1981)			8:25145
	Proc. Symp. Eng. Probl. Fusion Res., 1244-1247(1981)			8:25146
	Proc. Symp. Eng. Probl. Fusion Res., 1248-1251(1981)			8:25147
	Proc. Symp. Eng. Probl. Fusion Res., 1252-1256(1981)			8:25148
	Proc. Symp. Eng. Probl. Fusion Res., 1257-1260(1981)			8:25149
	Proc. Symp. Eng. Probl. Fusion Res., 1261-1264(1981)			8:25150
	Proc. Symp. Eng. Probl. Fusion Res., 1265-1269(1981)			8:25151
	Proc. Symp. Eng. Probl. Fusion Res., 1270-1273(1981)			8:25152
	Proc. Symp. Eng. Probl. Fusion Res., 1548-1551(1981)			8:25153
	Proc. Symp. Eng. Probl. Fusion Res., 1560-1561(1981)			8:25154
	Proc. Symp. Eng. Probl. Fusion Res., 1616(1981)			8:25155
	Proc. Symp. Eng. Probl. Fusion Res., 1901-1904(1981)			8:25156
	Proc. Symp. Eng. Probl. Fusion Res., 11-14(1981)			8:25157
	Proc. Symp. Eng. Probl. Fusion Res., 222-225(1981)			8:25158
	Proc. Symp. Eng. Probl. Fusion Res., 236-238(1981)			8:25159
	Proc. Symp. Eng. Probl. Fusion Res., 240-243(1981)			8:25160
	Proc. Symp. Eng. Probl. Fusion Res., 244-247(1981)			8:25161
	Proc. Symp. Eng. Probl. Fusion Res., 248-251(1981)			8:25162
	Proc. Symp. Eng. Probl. Fusion Res., 252-254(1981)			8:25163
	Proc. Symp. Eng. Probl. Fusion Res., 255-258(1981)			8:25164
	Proc. Symp. Eng. Probl. Fusion Res., 483-486(1981)			8:25165
	Proc. Symp. Eng. Probl. Fusion Res., 495-498(1981)			8:25166
	Proc. Symp. Eng. Probl. Fusion Res., 503-506(1981)			8:25167
	Proc. Symp. Eng. Probl. Fusion Res., 601-603(1981)			8:25168
	Proc. Symp. Eng. Probl. Fusion Res., 604-607(1981)			8:25169
	Proc. Symp. Eng. Probl. Fusion Res., 608-610(1981)			8:25170
	Proc. Symp. Eng. Probl. Fusion Res., 696-699(1981)			8:25171
	Proc. Symp. Eng. Probl. Fusion Res., 719-722(1981)			8:25172
	Proc. Symp. Eng. Probl. Fusion Res., 723-727(1981)			8:25173
	Proc. Symp. Eng. Probl. Fusion Res., 728-731(1981)			8:25174
	Proc. Symp. Eng. Probl. Fusion Res., 740-743(1981)			8:25175
	Proc. Symp. Eng. Probl. Fusion Res., 880-883(1981)			8:25176
	Proc. Symp. Eng. Probl. Fusion Res., 884-886(1981)			8:25177
	Proc. Symp. Eng. Probl. Fusion Res., 890-893(1981)			8:25178
	Proc. Symp. Eng. Probl. Fusion Res., 904-907(1981)			8:25179
	Proc. Symp. Eng. Probl. Fusion Res., 908-912(1981)			8:25180
	Proc. Symp. Eng. Probl. Fusion Res., 916-919(1981)			8:25181
	Proc. Symp. Eng. Probl. Fusion Res., 924-927(1981)			8:25182
	Proc. Symp. Eng. Probl. Fusion Res., 928-931(1981)			8:25183
	Proc. Symp. Eng. Probl. Fusion Res., 932-935(1981)			8:25184
	Proc. Symp. Eng. Probl. Fusion Res., 936-940(1981)			8:25185
	Proc. Symp. Eng. Probl. Fusion Res., 954-957(1981)			8:25186
	Proc. Symp. Eng. Probl. Fusion Res., 969-972(1981)			8:25187
	Proc. Symp. Eng. Probl. Fusion Res., 989-992(1981)			8:25188
	Proc. Symp. Eng. Probl. Fusion Res., 993-996(1981)			8:25189
	Proc. Symp. Eng. Probl. Fusion Res., 997-999(1981)			8:25190
	Proc. Symp. Eng. Probl. Fusion Res., 1000-1002(1981)			8:25191
	Proc. Symp. Eng. Probl. Fusion Res., 1015-1017(1981)			8:25192
	Proc. Symp. Eng. Probl. Fusion Res., 1018-1021(1981)			8:25193
	Proc. Symp. Eng. Probl. Fusion Res., 1026-1029(1981)			8:25194
	Proc. Symp. Eng. Probl. Fusion Res., 1030-1033(1981)			8:25195
	Proc. Symp. Eng. Probl. Fusion Res., 1034-1037(1981)			8:25196
	Proc. Symp. Eng. Probl. Fusion Res., 1038-1039(1981)			8:25197
	Proc. Symp. Eng. Probl. Fusion Res., 1047-1050(1981)			8:25198
	Proc. Symp. Eng. Probl. Fusion Res., 1369-1372(1981)			8:25199
	Proc. Symp. Eng. Probl. Fusion Res., 1378-1382(1981)			8:25200
	Proc. Symp. Eng. Probl. Fusion Res., 1383-1386(1981)			8:25201
	Proc. Symp. Eng. Probl. Fusion Res., 1387-1389(1981)			8:25202
	Proc. Symp. Eng. Probl. Fusion Res., 1390-1393(1981)			8:25203
	Proc. Symp. Eng. Probl. Fusion Res., 1556-1559(1981)			8:25204
	Proc. Symp. Eng. Probl. Fusion Res., 1562-1565(1981)			8:25205
	Proc. Symp. Eng. Probl. Fusion Res., 1577-1580(1981)			8:25206
	Proc. Symp. Eng. Probl. Fusion Res., 1581-1584(1981)			8:25207
	Proc. Symp. Eng. Probl. Fusion Res., 1585-1588(1981)			8:25208
	Proc. Symp. Eng. Probl. Fusion Res., 1593-1596(1981)			8:25209
	Proc. Symp. Eng. Probl. Fusion Res., 1597-1600(1981)			8:25210
	Proc. Symp. Eng. Probl. Fusion Res., 1601-1604(1981)			8:25211
	Proc. Symp. Eng. Probl. Fusion Res., 1637-1640(1981)			8:25212
	Proc. Symp. Eng. Probl. Fusion Res., 1645-1648(1981)			8:25213
	Proc. Symp. Eng. Probl. Fusion Res., 1649(1981)			8:25214
	Proc. Symp. Eng. Probl. Fusion Res., 1662-1665(1981)			8:25215
	Proc. Symp. Eng. Probl. Fusion Res., 1670-1673(1981)			8:25216
	Proc. Symp. Eng. Probl. Fusion Res., 1674(1981)			8:25217
	Proc. Symp. Eng. Probl. Fusion Res., 1688-1691(1981)			8:25218
	Proc. Symp. Eng. Probl. Fusion Res., 1713-1716(1981)			8:25219
	Proc. Symp. Eng. Probl. Fusion Res., 1797-1800(1981)			8:25220
	Proc. Symp. Eng. Probl. Fusion Res., 1924-1927(1981)			8:25221
176	*See* UCRL-85986	DE82012751	ND -20b	8:24845
198	NTIS, PC A02/MF A01	DE83008537	MN -20d	8:24821
199	NTIS, PC A02/MF A01	DE83008673	MN -21	8:24822
200	NTIS, PC A02/MF A01; 1	DE83008509	MN -20d	8:24823
201	NTIS, PC A02/MF A01; 1	DE83007644	MN -20d	8:24824

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-811051-	(US-Japan superconductive magnetic energy storage workshop, Madison, WI, USA, 19-23 Oct 1981)			
4	NTIS, PC A02/MF A01	DE83008672	MN -38	8:24102
CONF-8110112-	(Specialists' meeting on liquid metals thermal hydraulics, Cambridge, MA, USA, 5-6 Oct 1981)			
2	NTIS, PC A02/MF A01	DE83008699	MN -79p	8:23605
CONF-8110242-	(International workshop on resonances in heavy ion collisions, Bad Honnef, F.R. Germany, 12-15 Oct 1981)			
3	NTIS, PC A02/MF A01; 1	DE83008698	MN -34D	8:24651
CONF-8110256-	(Conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options, Baton Rouge, LA, USA, 5-7 Oct 1981)			
	See FWS/OBS-82/59		MN -11	8:24267
CONF-8110259-	(Numerical integration meeting, Oberwolfach, F.R. Germany, 4-10 Oct 1981)			
1	NTIS, PC A02/MF A01	DE83008674	MN -32	8:25268
CONF-811103-	(ANS winter meeting, San Francisco, CA, USA, 29 Nov-4 Dec 1981)			
34	*See* LBL-13091	DE81029858	MN -41	8:24342
128	NTIS, PC A02/MF A01	DE83007946	MN -20d	8:24825
CONF-811132-	(Fall meeting of the Society of Mining Engineers, Denver, CO, USA, 18-20 Nov 1981)			
2	NTIS, PC A02/MF A01; 1	DE83008441	MN -88	8:22972
CONF-811145-	(International conference on neutron irradiation effects, Argonne, IL, USA, 9-12 Nov 1981)			
18	NTIS, PC A02/MF A01; 1	DE83007796	MN -25	8:23931
CONF-811150-	(Yamada conference on point defects and defect interactions in metals, Kyoto, Japan, 16-20 Nov 1981)			
13	NTIS, PC A02/MF A01	DE83007855	MN -25	8:23932
14	NTIS, PC A02/MF A01; 1	DE83007649	MN -25	8:23933
15	NTIS, PC A02/MF A01; 1	DE83007794	MN -34A	8:23934
16	NTIS, PC A02/MF A01; 1	DE83007793	MN -25	8:23935
17	NTIS, PC A02/MF A01; 1	DE83007774	MN -25	8:23936
18	NTIS, PC A02/MF A01; 1	DE83007689	MN -25	8:23937
CONF-811221-	(American Society of Agricultural Engineers meeting, Chicago, IL, USA, 15-18 Dec 1981)			
	ASAE Tech. Pap., No. 81-3589, 25(1981)			8:23227
	ASAE Tech. Pap., No. 81-4539, 1-10(1981)			8:23289
	ASAE Tech. Pap., vp(1981)			8:23868
	ASAE Tech. Pap., No. 81-1524, 1-27(1981)			8:23869
	ASAE Tech. Pap., No. 81-1547, 24(1981)			8:23887
CONF-811242-	(International conference on the applications of the Moessbauer effect, Jaipur, India, 14-18 Dec 1981)			
2	NTIS, PC A02/MF A01; 1	DE83008445	MN -90a	8:24057
CONF-811276-	(Materials engineering conference, Haifa, Israel, 20-22 Dec 1981)			
1	NTIS, PC A02/MF A01	DE83007860	MN -25	8:23216
CONF-820101-	(3. joint conference on applications of air pollution meteorology, San Antonio, TX, USA, 11-15 Jan 1982)			
6	NTIS MF A01; 2	DE83008618	MN -11	8:24231
CONF-820128-	(61. annual meeting of the Transportation Research Board, Washington, DC, USA, 18-22 Jan 1982)			
7	NTIS, PC A03/MF A01; 1	DE83007640	MN -96	8:23843
CONF-820134-	(IEEE Power Engineering Society winter meeting, New York, NY, USA, 30 Jan-4 Feb 1982)			
1	NTIS, PC A02; 3	DE82011513	ND -97d	8:23393
CONF-820203-	(Society of Automotive Engineers international congress and exposition, Detroit, MI, USA, 22-26 Feb 1982)			
6	NTIS, PC A02/MF A01; 1	DE83008622	MN -96	8:23729
CONF-820205-	(111. AIME annual meeting, Dallas, TX, USA, 1 Feb 1982)			
6	NTIS, PC A04/MF A01	DE83007513	MN -25	8:23938
CONF-820220-	(February session of the Cooling Tower Institute, Houston, TX, USA, 1-3 Feb 1982)			
2	NTIS, PC A02/MF A01; 1	DE83007511	MN -11	8:24349
CONF-820274-	(2. national symposium on positron annihilation, Madras, India, 8-12 Feb 1982)			
2	NTIS, PC A02/MF A01; 1	DE83007628	MN -80	8:23939
3	NTIS, PC A02/MF A01; 1	DE83007627	MN -80	8:24721
CONF-820275-	(Workshop on effects of air pollution on farm commodities, Washington, DC, USA, 17 Feb 1982)			
1	NTIS, PC A03/MF A01; 1	DE83007514	MN -11	8:24403
CONF-820276-	(Workshop on LAMPF II synchrotron, Los Alamos, NM, USA, 8-12 Feb 1982)			
	See LA-9511-C	DE83008275	STD -28	8:24183
CONF-820303-	(Waste management conference, Tucson, AZ, USA, 8-11 Mar 1982)			
44	NTIS, PC A02/MF A01	DE83008659	MN -70B	8:23119
CONF-820309-	(3. international symposium on energy conservation in the built environment, Dublin, Ireland, 30 Mar-1 Apr 1982)			
6	NTIS, PC A02/MF A01	DE83008661	MN -59c	8:23316
CONF-820322-	(Federal information processing standards software documentation workshop, Washington, DC, USA, 3 Mar 1982)			
4	NTIS, PC A02/MF A01	DE83007620	MN -32	8:25267

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-820345-	(Symposium on heating in toroidal plasmas, Grenoble, France, 22-27 Mar 1982)			
17	*See* PPPL-1977	DE83008981	STD -20f	8:24766
CONF-820357-	(International conference on spin excitations in nuclei, Telluride, CO, USA, 25-27 Mar 1982)			
8	NTIS, PC A02/MF A01; 1	DE83008664	MN -34C	8:24644
CONF-820397-	(Conference on differential equations - lecture notes in mathematics, Dundee, UK, 29 Mar-2 Apr 1982)			
2	NTIS, PC A03/MF A01	DE83008552	MN -34	8:24722
CONF-8203100-	(Light-electromagnetic compatibility conference, Berkeley, CA, USA, 18-19 Mar 1982)			
	See LBL-15199	DE83005707	STD -95d	8:23819
CONF-8203119-	(Workshop on muon science and facilities at Los Alamos, Los Alamos, NM, USA, 15-18 Mar 1982)			
	See LA-9582-C	DE83004473	STD -34	8:24545
CONF-8203121-	(5. conference on small city and regional communities, Stevens Point, WI, USA, 25-26 Mar 1982)			
1	NTIS, PC A02/MF A01	DE83008662	MN -13	8:23698
CONF-8203123-	(Workshop on effects of trace elements on aquatic ecosystems, Raleigh, NC, USA, 23-24 Mar 1982)			
1	*See* UCRL-88867	DE83009241	MN -12	8:23429
CONF-820406-	(Topical meeting on fast, thermal and fusion reactor experiments, Salt Lake City, UT, USA, 12-15 Apr 1982)			
27	NTIS, PC A02/MF A01; 1	DE83008528	MN -80	8:23587
CONF-820410-	(ASME solar energy conference, Albuquerque, NM, USA, 26-30 Apr 1982)			
1	*See* SERI/TP-254-1492	DE82010089	ND -59c	8:23326
CONF-820420-	(International ENS/ANS conference on nuclear energy with emphasis on fuel cycles, Brussels, Belgium, 26-30 Apr 1982)			
12	NTIS, PC A02/MF A01	DE83007775	MN -80	8:23576
CONF-820422-	(American Society of Civil Engineers conference, Las Vegas, NV, USA, 26-30 Apr 1982)			
4	NTIS, PC A02/MF A01; 1	DE83007806	MN -13	8:23697
CONF-820428-	(Conference on lasers in nuclear physics, Oak Ridge, TN, USA, 21-23 Apr 1982)			
11	NTIS, PC A02/MF A01; 1	DE83008529	MN -34C	8:24174
CONF-820434-	(6. international conference on positron annihilation, Arlington, TX, USA, 3-7 Apr 1982)			
17	NTIS, PC A02/MF A01; 1	DE83007820	MN -25	8:23940
18	NTIS, MF02/MF A01; 1	DE83007969	MN -25	8:23941
19	NTIS, PC A02/MF A01; 1	DE83007623	MN -80	8:23942
CONF-820441-	(15. oil shale symposium, Golden, CO, USA, 27-30 Apr 1982)			
6	NTIS, PC A02/MF A01; 1	DE83007823	MN -91	8:23088
CONF-820472-	(American Nuclear Society topical meeting on LWR extended burnup - fuel performance and utilization, Williamsburg, VA, USA, 4-8 Apr 1982)			
Vol.1	*See* DOE/NE/34087-T1-Vol.1	DE82021736	STD -78	8:23448
Vol.2	*See* DOE/NE/34087-T1-Vol.2	DE83001866	STD -78	8:23458
CONF-8204118-	(Workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of outer continental shelf development, Long Beach, MS, USA, 6-8 Apr 1982)			
Summ.	*See* FWS/OBS-83/03		MN -11	8:23040
CONF-8204119-	(3. international recycling congress, Berlin, F.R. Germany, 19-21 Apr 1982)			
1	NTIS, PC A02/MF A01; 1	DE83008625	MN -95e	8:23873
CONF-820506-	(Spring meeting of the Electrochemical Society, Montreal, Canada, 9-14 May 1982)			
8	NTIS, PC A02/MF A01; 1	DE83007670	MN -4	8:24058
CONF-820545-	(5. international conference on plasma surface, Gatlinburg, TN, USA, 3-5 May 1982)			
9	*See* SAND-82-1269C	DE82017025	MN -21	8:24775
CONF-820548-	(International symposium on the properties and applications of metal hydrides, Toba, Japan, 30 May-4 Jun 1982)			
6	NTIS, PC A02/MF A01; 1	DE83007669	MN -25	8:23997
CONF-820551-	(EPA/EPRI symposium on flue gas desulfurization, Hollywood, FL, USA, 17-20 May 1982)			
2	NTIS, PC A02/MF A01	DE83008420	MN -90b	8:23428
CONF-8205116-	(5. international conference on novel results in particle physics, Nashville, TN, USA, 24-26 May 1982)			
4	*See* BONN-HE-82-16	DE83750137	MN -34D	8:24575
CONF-8205166-	(Seminar on municipal solid waste as a utility fuel, Miami Beach, FL, USA, 13 May 1982)			
	See EPRI-CS-2723	DE83900756	MN -69	8:23877
CONF-8205167-	(Governor's conference on expanding the use of coal in New York State: problems and issues, Albany, NY, USA, 21-22 May 1982)			
1	NTIS, PC A02/MF A01; 1	DE83008431	MN -90d	8:22918
CONF-8205168-	(6. coordination meeting, Brussels, Belgium, 6-7 May 1982)			
1-Summ.	*See* CEA-CONF-6298	DE83770042	MN -61b	8:23260
CONF-8205169-	(US/Dutch international symposium on nitrogen oxides, Maastricht, Netherlands, 24-28 May 1982)			
1	NTIS, PC A02/MF A01	DE83008643	MN -11	8:24406

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-8205170-	(Conference on radiation carcinogenesis: epidemiology and biological significance, Washington, DC, USA, 24-26 May 1982)			
1	NTIS, PC A02/MF A01	DE83008506	MN -48	8:24364
CONF-820601-	(ASME pressure vessel and piping conference, Orlando, FL, USA, 27 Jun-1 Jul 1982)			
27	NTIS, PC A02/MF A01; 1	DE83008746	MN -79p	8:23542
CONF-820604-	(AIAA/ASME joint conference on fluids, plasma, thermophysics and heat transfer, St Louis, MO, USA, 7-11 Jun 1982)			
13	*See* ALO-5365-4	DE83008760	MN -38	8:23350
14	NTIS, PC A02/MF A01	DE83008624	MN -80	8:23588
CONF-820605-	(World hydrogen energy conference, Pasadena, CA, USA, 13-17 Jun 1982)			
27	NTIS, PC A02/MF A01	DE83007626	MN -80	8:23998
CONF-820609-	(American Nuclear Society annual meeting, Los Angeles, CA, USA, 6-11 Jun 1982)			
	Trans. Am. Nucl. Soc., 41: 159(Jun 1982)			8:23180
	Trans. Am. Nucl. Soc., 41: 181(Jun 1982)			8:23537
	Trans. Am. Nucl. Soc., 41: 360-361(Jun 1982)			8:23546
	Trans. Am. Nucl. Soc., 41: 361-362(Jun 1982)			8:23547
	Trans. Am. Nucl. Soc., 41: 615-616(Jun 1982)			8:23570
	Trans. Am. Nucl. Soc., 41: 525(Jun 1982)			8:23571
	Trans. Am. Nucl. Soc., 41: 703-706(Jun 1982)			8:23577
	Trans. Am. Nucl. Soc., 41: 576-578(Jun 1982)			8:23578
	Trans. Am. Nucl. Soc., 41: 520(Jun 1982)			8:23639
	Trans. Am. Nucl. Soc., 41: 261-263(Jun 1982)			8:23640
	Trans. Am. Nucl. Soc., 41: 362-364(Jun 1982)			8:23641
	Trans. Am. Nucl. Soc., 41: 364-366(Jun 1982)			8:23642
	Trans. Am. Nucl. Soc., 41: 366-367(Jun 1982)			8:23643
	Trans. Am. Nucl. Soc., 41: 369-370(Jun 1982)			8:23644
	Trans. Am. Nucl. Soc., 41: 374-375(Jun 1982)			8:23645
	Trans. Am. Nucl. Soc., 41: 376-377(Jun 1982)			8:23646
	Trans. Am. Nucl. Soc., 41: 377-378(Jun 1982)			8:23647
	Trans. Am. Nucl. Soc., 41: 379-380(Jun 1982)			8:23648
	Trans. Am. Nucl. Soc., 41: 381-382(Jun 1982)			8:23649
	Trans. Am. Nucl. Soc., 41: 382(Jun 1982)			8:23650
	Trans. Am. Nucl. Soc., 41: 383-385(Jun 1982)			8:23651
	Trans. Am. Nucl. Soc., 41: 386-387(Jun 1982)			8:23652
	Trans. Am. Nucl. Soc., 41: 394-396(Jun 1982)			8:23653
	Trans. Am. Nucl. Soc., 41: 398-399(Jun 1982)			8:23654
	Trans. Am. Nucl. Soc., 41: 399-400(Jun 1982)			8:23655
	Trans. Am. Nucl. Soc., 41: 404(Jun 1982)			8:23656
	Trans. Am. Nucl. Soc., 41: 317-318(Jun 1982)			8:23657
	Trans. Am. Nucl. Soc., 41: 629-630(Jun 1982)			8:24191
	Trans. Am. Nucl. Soc., 41: 628-629(Jun 1982)			8:24192
	Trans. Am. Nucl. Soc., 41: 519(Jun 1982)			8:24912
81	NTIS, PC A02/MF A01	DE83008748	MN -38	8:24103
CONF-820627-	(75. annual meeting on the Air Pollution Control Association, New Orleans, LA, USA, 20-25 Jun 1982)			
14	NTIS, PC A02/MF A01; 1	DE83007624	MN -80	8:22946
15	NTIS, PC A02/MF A01	DE83008503	MN -11	8:23700
CONF-820628-	(11. international symposium on effects of radiation on materials, American Society for Testing and Materials, Scottsdale, AZ, USA, 28-30 Jun 1982)			
22	NTIS, PC A02/MF A01; 1	DE83007678	MN -25	8:23943
CONF-820655-	(Health Physics Society annual meeting, Las Vegas, NV, USA, 27 Jun-1 Jul 1982)			
13	NTIS, PC A02/MF A01	DE83008710	MN -41	8:24404
CONF-820659-	(4. conference on superconductivity in d- and f-band metals, Karlsruhe, F.R. Germany, 28-30 Jun 1982)			
6	NTIS, PC A02/MF A01	DE83007589	MN -25	8:23999
8	NTIS, PC A02/MF A01; 1	DE83007608	MN -25	8:23944
9	NTIS, PC A02/MF A01	DE83008623	MN -25	8:23945
CONF-820681-	(Annual ASES meeting, Houston, TX, USA, 1-5 Jun 1982)			
2	Univ. of Tennessee, Mechanical and Aerospace Engineering Dept. Knoxville		MN -59c	8:23317
CONF-8206117-	(13. international symposium on multiparticle dynamics, Volendam, Netherlands, 6-11 Jun 1982)			
2	*See* BONN-HE-82-17	DE83750139	MN -34D	8:24604
CONF-8206162-	(AIME symposium on superplastic forming of structural alloys, San Diego, CA, USA, 20-24 Jun 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007676	MN -25	8:24739
CONF-820704-	(International topical meeting on LMFBR safety, Lyon, France, 18-23 Jul 1982)			
37	NTIS, PC A02/MF A01; 1	DE83008467	MN -79p	8:23589
38	NTIS, PC A02/MF A01	DE83008466	MN -79b	8:23590
39	NTIS, PC A02/MF A01; 1	DE83008530	MN -79p	8:23591
40	NTIS, PC A02/MF A01	DE83008531	MN -79p	8:23592
41	NTIS MF A01; 2	DE83008465	MN -79p	8:23593
42	NTIS, PC A02/MF A01	DE83008464	MN -79p	8:23594
43	NTIS, PC A02/MF A01	DE83008463	MN -79h	8:23595
CONF-820717-	(PAHR information exchange conference, Karlsruhe, F.R. Germany, 28-30 Jul 1982)			
5	NTIS, PC A02/MF A01	DE83008649	MN -79h	8:23596

Report No.	Availability	Order No.	Distribution Category	Abstract No.
6	NTIS, PC A02/MF A01	DE83008500	MN -79h	8:23597
7	NTIS, PC A02/MF A01	DE83008550	MN -80	8:23598
8	NTIS, PC A02/MF A01	DE83008551	MN -80	8:23599
CONF-820738-	(INS symposium on dynamics of nuclear collective motion, Mount Fuji, Japan, 6-10 Jul 1982)			
6	NTIS MF A01; 2	DE83008504	MN -34C	8:24681
CONF-820773-	(NATO Advanced Study Institute conference on the systematics and the properties of the lanthanides, Braulage, F.R. Germany, 11-25 Jul 1982)			
1	NTIS, PC A04/MF A01	DE83007963	MN -4	8:24078
CONF-820775-	(Conference of the Society of Glass Technology, Cambridge, UK, 12-15 Jul 1982)			
1	*See* CEA-CONF-6419	DE83770040	MN -63	8:23261
CONF-820776-	(NATO Advanced Study Institute conference on the electronic structure of complex systems, Gent, Belgium, 12-23 Jul 1982)			
1	NTIS, PC A05/MF A01; 1	DE83008658	MN -34A	8:23946
CONF-820810-	(10. international mathematics and computers simulation congress on systems simulation and scientific computation, Montreal, Canada, 9-13 Aug 1982)			
17	NTIS, PC A02/MF A01	DE83008682	MN -78	8:23600
18	NTIS, PC A02/MF A01	DE83008683	MN -78	8:23601
CONF-820814-	(17. Intersociety Energy Conversion Engineering conference, Los Angeles, CA, USA, 8-13 Aug 1982)			
38	NTIS, PC A02/MF A01; 1	DE83008644	MN -90g	8:23772
39	NTIS, PC A02/MF A01	DE83008669	MN -79p	8:23602
40	NTIS, PC A02/MF A01	DE83008671	MN -96	8:23883
42	NTIS, PC A02/MF A01; 1	DE83008665	MN -94cb	8:23672
43	NTIS, PC A02/MF A01; 1	DE83008668	MN -98F	8:23701
44	NTIS MF A01; 2	DE83008667	MN -94a	8:23356
CONF-820839-	(International conference on X-ray and VUV synchrotron radiation instrumentation, Hamburg, F.R. Germany, 9-13 Aug 1982)			
7	NTIS, PC A02/MF A01	DE83008687	MN -28	8:24209
CONF-820864-	(4. europhysical topical conference on lattice defects in ionic crystals, Dublin, Ireland, 30 Aug-3 Sep 1982)			
4	NTIS, PC A02/MF A01	DE83008524	MN -25	8:24000
CONF-820883-	(9. international mass spectrometry conference, Vienna, Austria, 29 Aug-3 Sep 1982)			
3	NTIS, PC A02/MF A01; 1	DE83008648	MN -34A	8:24519
CONF-820899-	(Summer school on nuclear dynamics, Victoria, BC, Canada, 23 Aug-3 Sep 1982)			
3	NTIS, PC A04/MF A01	DE83008684	MN -34D	8:24605
CONF-8208106-	(4. international conference on photochemical conversion and storage of solar energy, Jerusalem, Israel, 8 Aug-13 Sep 1982)			
2	*See* CEA-CONF-6425	DE83770041	MN -61c	8:23262
CONF-8208111-	(Workshop on cognitive modeling of nuclear plant control room operators, Dedham, MA, USA, 15-18 Aug 1982)			
	See NUREG/CR-3114	DE83006002	MN -80	8:23556
CONF-8208113-	(International symposium on process systems engineering, Kyoto, Japan, 1 Aug 1982)			
2	*See* DOE/ER/10645-8	DE83007321	MN -4	8:23029
CONF-8208116-	(20. symposium on the engineering aspects of MHD, Irvine, CA, USA, 14-16 Aug 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007865	MN -59c	8:23299
CONF-820901-	(7. international heat transfer conference, Munich, F.R. Germany, 6-10 Sep 1982)			
9	NTIS, PC A02/MF A01	DE83008630	MN -38	8:24104
CONF-820907-	(13. international power sources symposium, Brighton, UK, 27-30 Sep 1982)			
4	NTIS, PC A02/MF A01; 1	DE83008604	MN -94ca	8:23673
CONF-820909-	(National meeting of the American Chemical Society, Kansas City, MO, USA, 1 Sep 1982)			
19	NTIS, PC A03/MF A01; 1	DE83007787	MN -4	8:24001
CONF-820911-	(Symposium on low level waste disposal, Washington, DC, USA, 29-30 Sep 1982)			
4	NTIS, PC A02/MF A01	DE83008534	MN -70B	8:23183
CONF-820929-	(IUPAP international conference on magnetism, Kyoto, Japan, 6-10 Sep 1982)			
12	NTIS, PC A02/MF A01	DE83008606	MN -25	8:23947
13	NTIS, PC A02/MF A01	DE83008609	MN -25	8:24002
CONF-820941-	(5. international symposium on high energy spin physics, Upton, NY, USA, 16-22 Sep 1982)			
	American Inst. of Physics, 335 East 45th Street, New York, New York 10017			8:24574
15	*See* DOE/ER/40017-4	DE83007421	MN -34D	8:24176
CONF-820948-	(12. symposium on fusion technology, Juelich, F.R. Germany, 13-17 Sep 1982)			
7	*See* GA-A-16845	DE83008457	MN -20b	8:24829
CONF-820962-	(NRC/ANS meeting on basic thermal hydraulic mechanisms in LWR analysis, Bethesda, MD, USA, 14-15 Sep 1982)			
4	NTIS, PC A03/MF A01	DE83007721	MN -78	8:23603

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-820997-	(Workshop on beam cooling, Stoughton, WI, USA, 9-11 Sep 1982)			
3	*See* FERMILAB-PUB-82/92	DE83004260	MN -28	8:24194
CONF-820998-	(Workshop on the interface between radiation physics and radiation chemistry, Chicago, IL, USA, 9-10 Sep 1982)			
3	*See* LA-UR-82-3299	DE83003571	MN -34	8:24727
CONF-8209101-	(Inelastic ion, surface collision conference, Middlefart, Denmark, 21-24 Sep 1982)			
3	NTIS, PC A02/MF A01	DE83007709	MN -04	8:24521
CONF-8209104-	(Annual meeting of the American Sociological Association, San Francisco, CA, USA, 6 Sep 1982)			
2	NTIS, PC A02/MF A01	DE83008605	MN -70	8:23120
CONF-8209105-	(Conference on physics of semiconductors in high magnetic fields, Grenoble, France, 1 Sep 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007719	MN -80	8:23888
CONF-8209106-	(10. international colloquium on magnetic films and surfaces, Yokohama, Japan, 13-16 Sep 1982)			
1	NTIS, PC A02/MF A01	DE83007664	MN -80	8:23949
CONF-8209113-	(CECAM workshop, Paris, France, 13 Sep-1 Oct 1982)			
1	*See* LA-UR-83-291	DE83007576	MN -21	8:24764
CONF-821008-	(IEEE annual meeting of the Industry Applications Society, San Francisco, CA, USA, 4-7 Oct 1982)			
3	NTIS, PC A02/MF A01	DE83008758	MN -90c	8:22947
CONF-821015-	(Electrochemical Society fall meeting, Detroit, MI, USA, 17-22 Oct 1982)			
6	NTIS, PC A02/MF A01; 1	DE83008642	MN -94cc	8:23674
7	NTIS, PC A02/MF A01; 1	DE83008690	MN -94cb	8:23675
8	NTIS, PC A02/MF A01	DE83008689	MN -94ca	8:23884
9	NTIS, PC A02/MF A01	DE83008691	MN -94ca	8:23676
CONF-821045-	(Symposium on effective utilization of surface analysis techniques in plasma surface interactions, Sapporo, Japan, 4-7 Oct 1982)			
3	NTIS, PC A02/MF A01; 1	DE83007720	MN -80	8:24759
CONF-821049-	(TMS/AIME fall meeting, St. Louis, MO, USA, 24-28 Oct 1982)			
17	*See* HEDL-SA-2700	DE83008402	MN -20c	8:24830
18	NTIS, PC A03/MF A01	DE83008694	MN -34A	8:23948
20	*See* HEDL-SA-2687-FP	DE83008404	MN -25	8:23955
CONF-821066-	(Symposium for Northeastern, Seattle, WA, USA, 6-8 Oct 1982)			
3	NTIS, PC A02/MF A01	DE83008692	MN -28	8:24159
CONF-8210130-	(EIA symposium on short-term energy forecasting, Arlington, VA, USA, 29 Oct 1982)			
Summ.	NTIS, PC A05/MF A01; 1	DE83008135	MN -13	8:23721
CONF-8210131-	(Gas calorimetry workshop, Batavia, IL, USA, 28-29 Oct 1982)			
1	*See* BNL-32603	DE83008581	MN -34D	8:24195
CONF-821101-	(ASME winter annual meeting, Phoenix, AZ, USA, 14-19 Nov 1982)			
19	Univ. of Tennessee, Mechanical and Aerospace Engineering Dept., Knoxville	DE83901531	MN -59c	8:23318
CONF-821106-	(Annual meeting of heat transfer and energy conversion, Los Angeles, CA, USA, 14-18 Nov 1982)			
29	NTIS, PC A02/MF A01; 1	DE83008532	MN -94cc	8:23677
30-Pt.1	*See* DOE/ER/10645-10-Pt.1	DE83007109	MN -4	8:24106
30-Pt.2	*See* DOE/ER/10645-10-Pt.2	DE83009119	MN -38	8:23860
CONF-821107-	(6. international symposium on the scientific basis for radioactive waste management, Boston, MA, USA, 1-4 Nov 1982)			
52	*See* RHO-BW-SA-219-P	DE83008328	MN -70	8:23174
CONF-821111-	(29. national symposium on American Vacuum Society, Baltimore, MD, USA, 16-19 Nov 1982)			
22	*See* BNL-31913	DE83008589	MN -28	8:24144
23	*See* GA-A-16853	DE83008499	MN -20b	8:24763
CONF-821123-	(7. conference on the application of accelerators in research and industry, Denton, TX, USA, 8-10 Nov 1982)			
38	NTIS, PC A02/MF A01	DE83008645	MN -28	8:24175
CONF-821143-	(High angular momentum properties of nuclei conference, Oak Ridge, TN, USA, 2-4 Nov 1982)			
5	NTIS, PC A02/MF A01	DE83008190	MN -34C	8:24704
6	NTIS, PC A02/MF A01	DE83008189	MN -34C	8:24672
CONF-821155-	(International meeting on research and test reactor core conversions from HEU to LEU fuels, Argonne, IL, USA, 8-10 Nov 1982)			
7	NTIS, PC A02/MF A01; 1	DE83007956	MN -80	8:23604
CONF-821176-	(International conference on combustion of tomorrow's fuels, Santa Barbara, CA, USA, 8-12 Nov 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007641	MN -90e	8:24150
2	*See* DOE/FC-1006	DE83008573	MN -90e	8:22996
CONF-821177-	(2. European symposium on enhanced oil recovery, Paris, France, 8-10 Nov 1982) Paris, France; Editions Technip (1982).			8:23025
CONF-821178-	(DOE Basic Energy Sciences meeting, Washington, DC, USA, 17 Nov 1982)			
1	*See* PNL-SA-11151	DE83008438	MN -4	8:24052

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-821209-	(3. annual symposium on uranium mill tailings management, Ft. Collins, CO, USA, 9-10 Dec 1982)			
8	*See* LBL-15052	DE83008398	MN -70A	8:23148
CONF-821211-	(3. DOE battery and electrochemical contractors' conference, Crystal City, VA, USA, 7-9 Dec 1982)			
6	NTIS, PC A02/MF A01	DE83008621	MN -94cc	8:23678
CONF-821213-	(3. international conference on alternative energy source, Miami Beach, FL, USA, 13-15 Dec 1982)			
4	*See* BNL-32591	DE83008585	MN -94d	8:23667
5	*See* SERI/TP-254-1802	DE83009182	MN -58	8:23828
CONF-830128-	(International conference on photochemistry and photobiology, Alexandria, Egypt, 5-10 Jan 1983)			
2	*See* LBL-15485	DE83008395	MN -34A	8:24069
CONF-830205-	(Waste management conference, Tucson, AZ, USA, 27 Feb-3 Mar 1983)			
13	*See* PNL-SA-10780	DE83007391	MN -70	8:23167
14	*See* PNL-SA-11179	DE83008242	MN -70	8:23173
15	*See* PNL-SA-10777	DE83008238	MN -70	8:23166
16	*See* PNL-SA-11144	DE83007696	MN -70	8:23171
17	*See* PNL-SA-10800	DE83007859	MN -70	8:23168
18	*See* PNL-SA-11174	DE83007837	MN -70	8:23172
19	*See* PNL-SA-10832	DE83007836	MN -70	8:23170
20	*See* PNL-SA-10829	DE83007876	MN -70	8:23169
21	*See* PNL-SA-11163	DE83007875	MN -70	8:23105
22	*See* UCRL-88167	DE83009243	MN -22	8:23176
CONF-830210-	(5. topical conference on radio frequency plasma heating, Madison, WI, USA, 21-23 Feb 1983)			
7	*See* UCRL-88562	DE83008593	MN -20d	8:24776
CONF-830218-	(American Public Power Association engineering and operations workshop, San Antonio, TX, USA, 14-17 Feb 1983)			
1	NTIS, PC A03/MF A01; 1	DE83901684	MN -90	8:22948
CONF-830219-	(EPA/NRC minerals management service workshop, Santa Barbara, CA, USA, 7-10 Feb 1983)			
1	*See* PNL-SA-11182	DE83007652	MN -11	8:24291
CONF-830220-	(31. annual meeting of the Radiation Research Society - epidemiology of irradiated human populations, San Antonio, TX, USA, 27 Feb-3 Mar 1983)			
1	*See* PNL-SA-10964	DE83007838	MN -41	8:24391
CONF-830221-	(ACRS meeting on fast reactors, Washington, DC, USA, 4 Feb 1983)			
1	*See* HEDL-SA-2854	DE83008971	MN -79p	8:23617
CONF-830301-	(ASME-JSME thermal engineering joint conference, Honolulu, HI, USA, 20-24 Mar 1983)			
7	*See* SAND-82-0899C	DE83005191	MN -66b	8:23382
9-Pt.1	*See* PNL-SA-9530-Pt.1	DE83007702	MN -12	8:24110
10	*See* DOE/ER/10394-2	DE83008631	MN -38	8:24105
CONF-830303-	(185. American Chemical Society national meeting, Seattle, WA, USA, 20-25 Mar 1983)			
10	*See* PNL-SA-10933	DE83007687	MN -61a	8:23279
12	*See* UCRL-88908	DE83009245	MN -92b	8:23086
CONF-830311-	(Particle accelerator conference, Santa Fe, NM, USA, 21-23 Mar 1983)			
5	*See* SAND-83-0558C	DE83007710	MN -28	8:24169
6	*See* UCRL-88283	DE83009238	MN -28	8:24189
7	*See* SAND-82-2453C	DE83009165	MN -28	8:24185
8	*See* SAND-83-0649C	DE83009163	MN -28	8:24188
9	*See* SAND-83-0628C	DE83009185	MN -28	8:24187
10	*See* SAND-83-0514C	DE83009193	MN -28	8:24186
CONF-830321-	(JANNAF safety and environmental protection meeting, Livermore, CA, USA, 8-10 Mar 1983)			
1	*See* UCRL-88780	DE83008406	MN -92a	8:23069
2	*See* UCRL-88781	DE83008405	MN -92a	8:23070
3	*See* UCRL-88782	DE83008407	MN -92a	8:23071
CONF-830322-	(4. national conference on equal employment opportunity and affirmative action, Atlanta, GA, USA, 2-5 Mar 1983)			
1	*See* UCRL-88904	DE83009242	MN -13	8:25232
CONF-830406-	(5. topical meeting on technology of fusion energy, Knoxville, TN, USA, 26-28 Apr 1983)			
4	*See* UCRL-88222	DE83009117	MN -20e	8:24846
CONF-830407-	(International conference on acoustics, speech, and signal processing, Boston, MA, USA, 14-16 Apr 1983)			
2	*See* SAND-82-2975C	DE83008454	MN -32	8:25276
CONF-830409-	(Workshop on characterization and quantification of surface features on clastic and pyroclastic particles, Tempe, AZ, USA, 19-22 Apr 1983)			
1	*See* LA-UR-83-250	DE83006074	MN -11	8:24491
2	*See* LA-UR-83-117	DE83006053	MN -11	8:24490
CONF-830423-	(5. symposium on safeguards and nuclear material management, Versailles, France, 19-21 Apr 1983)			
1	NTIS, PC A02/MF A01; 1	DE83007749	MN -15	8:23190
CONF-830424-	(4. international ocean disposal symposium, Devon, UK, 11-15 Apr 1983)			
1	*See* UCRL-88812	DE83009247	MN -11	8:24295

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-830605-	(24. symposium on rock mechanics, College Station, TX, USA, 20 Jun 1983)			
2	*See* SAND-83-0474c	DE83007940	MN -11	8:24500
CONF-830705-	(IEEE Power Engineering Society summer meeting, Los Angeles, CA, USA, 17-22 Jul 1983)			
1	*See* BNL-32503	DE83007387	MN -97a	8:23432
DFVLR-FB-				
82-27	NTIS (US Sales Only), PC A06/MF A01	DE83750397	MN -62	8:23300
DHEW/PUB/NIOSH-				
78-168	*See* PB-83-139410			8:23010
DLCS-				
5000482	NTIS, PC A03/MF A01	DE83008075	MN -78	8:23470
DOE/AL/22028-				
T1	NTIS, PC A02/MF A01; 1	DE83006959	MN -23	8:23201
DOE/BC/10215-				
23	NTIS MF A01; 2	DE83009168	STD -92a	8:24497
DOE/BC/10467-				
11	NTIS, PC A03/MF A01; 1	DE83006618	STD -96	8:23879
12	NTIS, PC A03/MF A01; 1	DE83006617	STD -96	8:23880
13	NTIS, PC A04/MF A01	DE83006616	STD -96	8:23881
DOE/BC/10498-				
5	NTIS, PC A04/MF A01; 1	DE83009472	STD -92a	8:23050
DOE/BETC/RI-				
83/ 3	NTIS, PC A04/MF A01; 1	DE83008488	STD -92a	8:23016
DOE/BP-				
124	*See* DOE/EIS-0097	DE83002971	MN -11	8:24309
DOE/CE-				
0028/ 1	NTIS, PC A02/MF A01	DE83008759	STD -96	8:23886
DOE/CE/40551-				
T1	NTIS, PC A06/MF A01; 1	DE83009195	MN -95e	8:23857
DOE/CE/40583-				
T1	NTIS, PC A04/MF A01	DE83008386	MN -95f	8:23858
DOE/CS/20101-				
1	NTIS, PC A09/MF A01; 1	DE83009349	STD -95e	8:23874
DOE/CS/20156-				
T2	NTIS, PC A03/MF A01	DE83009169	STD -95e	8:23875
DOE/CS/20451-				
T1	NTIS, PC A05/MF A01	DE83009183	STD -95e	8:23876
DOE/CS/22804-				
T6	NTIS, PC A23/MF A01; 1	DE83005693	MN -95	8:23705
DOE/CS/30013-				
T7	NTIS, PC A12/MF A01	DE82014212	MN -98E	8:23001
DOE/CS/30127-				
T1	NTIS MF A01; 2	DE83005483	MN -59c	8:23319
DOE/CS/30254-				
5	NTIS, PC A10/MF A01; 1	DE83008114	MN -59c	8:23804
DOE/CS/32393-				
T1	NTIS, PC A07; 3	DE83009409	ND -59a	8:23320
DOE/CS/40312-				
2	NTIS MF A01; 2	DE83009370	MN -95f	8:23859
DOE/CS/64007-				
T1	NTIS, PC A03/MF A01	DE83008770	MN -95d	8:23809
T2	NTIS, PC A04/MF A01	DE83008495	MN -95d	8:23706
T3	NTIS, PC A04/MF A01	DE83008574	MN -95d	8:23810
T4	NTIS, PC A03/MF A01	DE83008458	MN -95d	8:23811
DOE/DP/40162-				
1	NTIS, PC A06/MF A01	DE83009311	MN -21	8:24826
DOE/EI/10565-				
T1	NTIS, PC A03/MF A01; 1	DE83008988	MN -92	8:23031
DOE/EI/10568-				
T1	NTIS, PC A06/MF A01	DE83008989	MN -98	8:23711
DOE/EI/10696-				
1-Vol.1	NTIS, PC A04/MF A01; 1	DE83008711	MN -98	8:23687
1-Vol.2	NTIS, PC A09/MF A01; 1	DE83008701	MN -13	8:23688
1-Vol.3-Pt.1	NTIS, PC A10/MF A01; 1		MN -13	8:23712
1-Vol.3-Pt.2	NTIS, PC A11/MF A01; 1	DE83008654	MN -13	8:23689
DOE/EI/11865-				
T1-Vol.1	NTIS, PC A04; 3	DE83007598	ND -32	8:25269
T1-Vol.2-A-D	NTIS, PC A07; 3	DE83007944	ND -32	8:25288
T1-Vol.3-App.E	NTIS, PC A13; 3	DE83007783	ND -32	8:25287
T1-Vol.4	NTIS, PC A02/MF A01	DE83007688	MN -32	8:25270
T1-Vol.5	NTIS, PC A03/MF A01	DE83007948	MN -32	8:25271
DOE/EIA-				
0035(82/ 04)	NTIS, PC A06/MF A01	DE83008014	MN -98G	8:23032
0035(83/ 01)	NTIS, PC A06/MF A01	DE83008802	MN -98G	8:23755
0035(83/ 02)	NTIS, PC A06/MF A01	DE83008804	MN -98G	8:23002
0040(82)	NTIS, PC A14/MF A01	DE83008041	MN -98E	8:23730
0075(82/ 01)	NTIS, PC A04/MF A01; 1	DE83008070	MN -98E	8:23410
0075(82/ 04)	NTIS, PC A04/MF A01	DE83008016	MN -98E	8:23411
0075(82/ 05)	NTIS, PC A04/MF A01; 1	DE83008015	MN -98E	8:23003
0075(82/ 09)	NTIS, PC A04/MF A01	DE83007760	MN -98E	8:23412
0075(82/ 10)	NTIS, PC A04/MF A01	DE83008823	MN -98E	8:23413
0075(82/ 11)	NTIS, PC A04/MF A01; 1	DE83009304	MN -98E	8:23414
0109(83/ 01)	NTIS, PC A06/MF A01; 1	DE83008785	MN -98B	8:23033
0109(83/ 02)	NTIS, PC A06/MF A01; 1	DE83008816	MN -98B	8:23034

Report No.	Availability	Order No.	Distribution Category	Abstract No.
0118(81)	NTIS, PC A06/MF A01; 1	DE83008784	MN -98A	8:23004
0121(82/ 3Q)	NTIS, PC A05/MF A01	DE83008801	MN -98A	8:23005
0130(83/ 01)	NTIS, PC A09/MF A01	DE83008803	MN -98C	8:23066
0167(81)	NTIS, PC A06/MF A01; 1	DE83008813	MN -98C	8:23048
0185(82)	NTIS, PC A07/MF A01	DE83008809	MN -98B	8:23017
0202(82/ 2Q) -2	NTIS, PC A06/MF A01	DE83008069	MN -98F	8:23690
0202(82/ 4Q) -2	NTIS, PC A06/MF A01	DE83008810	MN -98	8:23713
0226(81/ 11)	NTIS, PC A08/MF A01; 1	DE83007663	MN -98E	8:23731
0226(82/ 02)	NTIS, PC A08/MF A01	DE83008047	MN -98E	8:23732
0226(82/ 04)	NTIS, PC A08/MF A01	DE83008052	MN -98E	8:23733
0226(82/ 05)	NTIS, PC A08/MF A01; 1	DE83008051	MN -98E	8:23734
0226(82/ 06)	NTIS, PC A08/MF A01	DE83008058	MN -98E	8:23735
0226(82/ 07)	NTIS, PC A08/MF A01; 1	DE83008004	MN -98E	8:23736
0226(82/ 10)	NTIS, PC A06/MF A01; 1	DE83008790	MN -98E	8:23737
0226(82/ 11)	NTIS, PC A05/MF A01; 1	DE83008789	MN -98E	8:23738
0226(82/ 12)	NTIS, PC A06/MF A01; 1	DE83009323	MN -98E	8:23739
0249(83/ 1)	NTIS, PC A03/MF A01	DE83008818	MN -98	8:23691
0328	NTIS, PC A04/MF A01; 1	DE83009374	MN -98G	8:23756
0342(82)	NTIS, PC A03/MF A01; 1	DE83008791	MN -98C	8:23063
0349/ 1	NTIS, PC A07/MF A01; 1	DE83008952	MN -98	8:23699
0360(81)	NTIS, PC A05/MF A01	DE83008808	MN -98F	8:23758
0363	NTIS, PC A03/MF A01	DE83008807	MN -98A	8:23006
0365	NTIS, PC A05/MF A01	DE83008806	MN -98E	8:23740
0372/ 3	NTIS, PC A05/MF A01	DE83008786	MN -98B	8:23013
035612	NTIS, PC A10/MF A01	DE83008812	MN -98E	8:23741
DOE/EIS-				
0089-Add.	NTIS, PC A04/MF A01; 1	DE83007616	MN -11	8:24308
0097	NTIS, PC A14/MF A01; 1	DE83002971	MN -11	8:24309
DOE/EP-				
0040/ 1	NTIS, PC A04/MF A01	DE83009170	STD -41	8:24365
0043/ 1	NTIS, PC A03/MF A01	DE83008125	MN -92a	8:23018
DOE/EP/12079- T3	NTIS, PC A02/MF A01; 1	DE83007410	MN -11	8:24302
DOE/ER/00854- 39	NTIS, PC A04/MF A01	DE83008555	MN -4	8:24047
DOE/ER/01198- 1363	NTIS, PC A02/MF A01; 1	DE81030939	MN -34	8:24032
DOE/ER/02640- 14	NTIS, PC A05/MF A01; 1	DE83009371	MN -4	8:24522
DOE/ER/03069- T3	NTIS, PC A02/MF A01	DE83009156	MN -34D	8:24576
DOE/ER/03238- T1	NTIS, PC A03/MF A01; 1	DE83008232	MN -4	8:24076
DOE/ER/04178- 6	NTIS, PC A02/MF A01	DE83008747	MN -61c	8:23264
DOE/ER/04461- 3	NTIS, PC A04/MF A01; 1	DE83009248	MN -25	8:23950
DOE/ER/04972- 4	NTIS, PC A04/MF A01; 1	DE83008999	MN -51	8:23096
DOE/ER/05002- 32	NTIS, PC A03/MF A01	DE83008757	MN -25	8:23951
DOE/ER/10394- 2	NTIS, PC A02/MF A01	DE83008631	MN -38	8:24105
DOE/ER/10407- 3	NTIS, PC A02/MF A01	DE83008800	MN -34C	8:24641
DOE/ER/10421- 4	NTIS, PC A02/MF A01	DE83008986	MN -25	8:24022
DOE/ER/10477- 3	NTIS, PC A02/MF A01	DE83007971	MN -4	8:24081
DOE/ER/10613- 2	NTIS, PC A06/MF A01	DE83009278	STD -20f	8:24760
DOE/ER/10640- 3	NTIS, PC A02/MF A01	DE83009237	MN -34	8:24158
DOE/ER/10645- 8	NTIS MF A01	DE83007321	MN -4	8:23029
10-Pt.1	NTIS MF A01; 2	DE83007109	MN -4	8:24106
10-Pt.2	NTIS MF A01; 2	DE83009119	MN -38	8:23860
DOE/ER/10677- 5	NTIS, PC A03/MF A01; 1	DE83009093	MN -4	8:24082
DOE/ER/10731- 2	NTIS, PC A04/MF A01; 1	DE83009189	MN -41	8:24407
DOE/ER/10907- 2	NTIS, PC A03/MF A01; 1	DE83008961	MN -25	8:23952
DOE/ER/10915- 2	NTIS, PC A03/MF A01	DE83008763	MN -25	8:24003
DOE/ER/10921- T1	NTIS, PC A04/MF A01; 1	DE83009378	MN -11	8:24498
DOE/ER/10959- 2	NTIS, PC A03/MF A01	DE83008712	MN -38	8:24745
DOE/ER/12015- 4	NTIS, PC A02/MF A01	DE83008387	MN -04	8:24340
DOE/ER/40017- 4	NTIS, PC A02/MF A01	DE83007421	MN -34D	8:24176
DOE/ER/40033- 8	NTIS, PC A02/MF A01	DE82000593	MN -34D	8:24577

Report No.	Availability	Order No.	Distribution Category	Abstract No.
9	NTIS, PC A02/MF A01	DE82000665	MN -34D	8:24196
DOE/ER/70004-				
290	NTIS, PC A02; 3	DE82008308	ND -34D	8:24637
295	NTIS, PC A02; 3	DE82008305	ND -34D	8:24606
297	NTIS, PC A02; 3	DE82008303	ND -34D	8:24631
DOE/ER/70064-				
T1	NTIS, PC A02/MF A01; 1	DE82020511	MN -34C	8:24723
DOE/ER/71015-				
T1	NTIS MF A01; 2	DE83008383	MN -4	8:24059
DOE/ET/03425-				
19	NTIS, PC A04/MF A01; 1	DE83009158	MN -11	8:24232
DOE/ET/10069-				
T6	NTIS (US Sales Only), PC A08/MF A01; 1	DE83009157	STD -90d	8:22919
DOE/ET/10136-				
T1	NTIS, PC A04/MF A01; 1	DE83008924	MN -92a	8:23051
DOE/ET/10143-				
T35	NTIS MF A01; 2	DE83006713	MN -90d	8:22950
T36	NTIS, PC A06/MF A01; 1	DE83006712	MN -90d	8:22951
DOE/ET/10159-				
T24	NTIS, PC A12/MF A01; 1	DE83004846	STD -89	8:22920
DOE/ET/10815-				
58	NTIS, PC A08/MF A01; 1	DE83009249	STD -90g	8:23773
61	NTIS, PC A05/MF A01; 1	DE83007693	STD -90g	8:23774
DOE/ET/11056-				
T7	NTIS, PC A05/MF A01; 1	DE83005896	MN -90g	8:23775
DOE/ET/12103-				
T5	NTIS, PC A03/MF A01; 1	DE83008236	MN -90d	8:22921
DOE/ET/12188-				
1	NTIS, PC A99/MF A01; 1	DE83006591	STD -88	8:22984
DOE/ET/14054-				
4	NTIS, PC A04/MF A01; 1	DE83008460	STD -88	8:22973
DOE/ET/14236-				
1	NTIS, PC A06/MF A01; 1	DE83005617	STD -88	8:22974
2	NTIS, PC A11/MF A01; 1	DE83005618	STD -88	8:22975
DOE/ET/14759-				
T14	NTIS, PC A11/MF A01; 1	DE83008235	MN -90d	8:22922
DOE/ET/20216-				
T2	NTIS, PC A05/MF A01; 1	DE83009270	STD -62a	8:23301
DOE/ET/20279-				
156	NTIS, PC A02/MF A01; 1	DE82000663	MN -63	8:23265
157	NTIS, PC A02/MF A01; 1	DE82000664	MN -94b	8:23662
236	NTIS, PC A06/MF A01; 1	DE83008720	STD -63	8:23291
DOE/ET/20316-				
81-1	NTIS, PC A14/MF A01; 1	DE83007037	STD -60	8:23388
DOE/ET/21002-				
T25	NTIS, PC A02/MF A01	DE83008700	MN -64	8:23308
DOE/ET/23119-				
T1	NTIS, PC A14/MF A01; 1	DE83009258	MN -60	8:23390
DOE/ET/28365-				
24	NTIS, PC A05/MF A01	DE83009096	MN -66a	8:23368
26	NTIS, PC A04/MF A01; 1	DE83009097	MN -66a	8:23369
DOE/ET/29071-				
T4	NTIS, PC A07/MF A01; 1	DE83009379	MN -97a	8:23433
DOE/ET/34010-				
7	NTIS (US Sales Only), PC A03/MF A01; 1	DE83009723	STD -78	8:23471
8	NTIS (US Sales Only), PC A03/MF A01	DE83009718	STD -78	8:23472
DOE/ET/34026-				
6	NTIS (US Sales Only), PC A04/MF A01; 1	DE83008432	STD -78	8:23106
DOE/ET/34203-				
47	NTIS, PC A06/MF A01	DE83009392	STD -78	8:23447
DOE/ET/34212-				
36	NTIS (US Sales Only), PC A05/MF A01; 1	DE83008575	STD -78	8:23473
DOE/ET/44802-				
T5	NTIS, PC A05/MF A01; 1	DE83009116	STD -70	8:24484
DOE/ET/52048-				
19	NTIS, PC A02/MF A01	DE82000907	STD -20	8:24827
DOE/ET/53051-				
49	NTIS, PC A08/MF A01; 1	DE83009355	STD -20	8:24761
DOE/ET/53088-				
84	NTIS, PC A03/MF A01	DE83009162	MN -20g	8:24762
DOE/EV/00902-				
34	NTIS, PC A18; 3	DE82010798	ND -11	8:24302
DOE/EV/01300-				
T1	NTIS, PC A02/MF A01; 1	DE83008329	MN -48	8:24328
DOE/EV/02423-				
T1	NTIS, PC A02/MF A01	DE83008388	MN -48	8:24325
DOE/EV/02828-				
T1	NTIS, PC A03/MF A01	DE83008352	MN -48	8:24366
DOE/EV/02965-				
2	NTIS, PC A02/MF A01	DE83008666	MN -48	8:24408
DOE/EV/03292-				
3	NTIS, PC A03/MF A01; 1	DE83008371	MN -11	8:24278
DOE/EV/04326-				
4	NTIS, PC A06/MF A01; 1	DE83006975	MN -48	8:24197

Report No.	Availability	Order No.	Distribution Category	Abstract No.
DOE/EV/04703-				
37	NTIS, PC A02/MF A01	DE83008777	MN -34A	8:24523
38	NTIS, PC A11/MF A01; 1	DE83008780	MN -34A	8:24524
39	NTIS, PC A13/MF A01; 1	DE83008779	MN -34A	8:24525
40	NTIS, PC A02/MF A01	DE83008778	MN -34A	8:24526
DOE/EV/05572-				
4	NTIS, PC A06/MF A01	DE83008963	MN -11	8:24268
DOE/EV/10467-				
T1	NTIS, PC A06/MF A01; 1	DE83008991	MN -11	8:24279
DOE/EV/10731-				
T1	NTIS, PC A08/MF A01; 1	DE83008538	MN -41	8:24409
DOE/FC-				
1006	NTIS, PC A02/MF A01; 1	DE83008573	MN -90e	8:22996
DOE/FE/60138-				
T2	NTIS, PC A07/MF A01; 1	DE83007929	MN -92	8:23035
DOE/ID/01821-				
T1	NTIS, PC A04/MF A01; 1	DE83008990	MN -66b	8:23370
DOE/ID/12206-				
1	NTIS, PC A12/MF A01; 1	DE83007673	STD -97e	8:23243
2	NTIS, PC A06/MF A01; 1	DE83007639	STD -97e	8:23244
DOE/ID/12225-				
T2	NTIS, PC A03/MF A01; 1	DE83009198	MN -12	8:23861
DOE/ID/12348-				
T4	NTIS, PC A03/MF A01; 1	DE83008772	MN -70B	8:23121
DOE/IG-				
103	TIC	DE83006125	ND -96	8:23042
104	TIC	DE83006126	ND -13	8:25225
105	TIC	DE83006127	ND -2	8:25282
109	TIC	DE83006130	ND -61a	8:23254
110	TIC	DE83006131	ND -13	8:25226
111	TIC	DE83006310	ND -92	8:23722
112	TIC	DE83006311	ND -66f	8:23375
115	TIC	DE83006498	ND -13	8:25227
116	TIC	DE83006314	ND -11	8:23742
117	TIC	DE83006315	ND -13	8:23727
118	TIC	DE83006316	ND -61c	8:23302
119	TIC	DE83006317	ND -13	8:23043
120	TIC	DE83006318	ND -13	8:25228
121	TIC	DE83006319	ND -13	8:25229
122	TIC	DE83006320	ND -95d	8:23812
123	TIC	DE83006321	ND -91	8:23078
124	TIC	DE83006322	ND -91	8:23079
125	TIC	DE83006323	ND -91	8:23080
133	TIC	DE83006625	ND -13	8:25230
0189	TIC	DE83006929	ND -20	8:24828
DOE/JPL/955282-				
80/ 7	NTIS, PC A03/MF A01; 1	DE83009260	MN -63b	8:23266
DOE/JPL/955843-				
83/ 8	NTIS, PC A05/MF A01; 1	DE83008871	STD -63b	8:23267
DOE/JPL/955902-				
82/ 7	NTIS, PC A07/MF A01; 1	DE83008995	STD -63b	8:23268
DOE/JPL/955909-				
83/ 9	NTIS, PC A03/MF A01	DE83008998	STD -63b	8:23269
DOE/LC/10787-				
111	NTIS, PC A12/MF A01; 1	DE83007887	STD -91	8:23089
DOE/LC/10910-				
T1	NTIS, PC A09/MF A01; 1	DE83008498	STD -91	8:23085
DOE/LC/RI-				
83-2	NTIS, PC A08/MF A01; 1	DE83005592	STD -90c	8:22923
DOE/LLW-				
19T	NTIS, PC A06/MF A01; 1		MN -70B	8:23122
DOE/MA-				
0006/ 8	NTIS, PC A15/MF A01; 1	DE83009279	MN -13	8:25231
DOE/MC/08216-				
1257	NTIS, PC A03/MF A01	DE83009091	MN -92a	8:23052
T3	NTIS, PC A02/MF A01	DE83008774	MN -91	8:23072
T4	NTIS, PC A02/MF A01	DE83009090	MN -92a	8:23073
T5	NTIS, PC A06/MF A01; 1	DE83008927	MN -92a	8:23053
DOE/MC/08339-				
1348	NTIS MF A01; 2	DE83006907	STD -92a	8:23054
DOE/MC/12159-				
1344	NTIS, PC A03/MF A01	DE83008965	STD -92a	8:23055
DOE/MC/14060-				
T1	NTIS, PC A02/MF A01; 1	DE83009287	MN -91	8:23056
DOE/MC/14129-				
1375	NTIS, PC A04/MF A01; 1	DE83008237	STD -90e	8:24151
DOE/MC/14600-				
T1	NTIS, PC A03/MF A01	DE83007206	MN -90b	8:22924
DOE/MC/14693-				
1296-Vol.1	NTIS, PC A06/MF A01; 1	DE83003033	STD -91	8:23057
1296-Vol.2	NTIS, PC A15/MF A01; 1	DE83003035	STD -91	8:23058
DOE/MC/16528-				
1328	NTIS, PC A08/MF A01; 1	DE83005594	STD -90i	8:22925
DOE/METC/SP-				
194	NTIS, PC A04/MF A01	DE83009222	STD -90	8:22952

Report No.	Availability	Order No.	Distribution Category	Abstract No.
DOE/NASA/10350-35	NTIS, PC A04/MF A01; 1	DE83008176	STD -90f	8:23415
DOE/NBB-0022	NTIS, PC A04/MF A01	DE83008722	STD -11	8:24269
DOE/NBB-0027	NTIS, PC A07/MF A01; 1	DE83009215	MN -13	8:23723
DOE/NBM-1059	NTIS, PC A14/MF A01; 1	DE83008355	STD -61a	8:23270
3003138	NTIS, PC A02/MF A01; 1	DE83003138	MN -90b	8:22985
3007739	NTIS MF A01; 2	DE83007739	MN -98	8:23692
3007922	SERI, 1617 Cole Boulevard, Golden, CO 80401, $35.50			8:23762
3007960	NTIS, PC A03/MF A01; 1	DE83007960	MN -25	8:23953
3008218	NTIS, PC A03/MF A01	DE83008218	MN -90d	8:23219
3008220	NTIS MF A01; 2	DE83008220	MN -90i	8:22953
3008227	NTIS, PC A02; 3	DE83008227	ND -90a	8:22986
3008230	NTIS, PC A03/MF A01; 1	DE83008230	MN -90c	8:23220
3008233	NTIS, PC A02/MF A01	DE83008233	MN -90d	8:22926
3008425	NTIS, PC A02/MF A01; 1	DE83008425	MN -90i	8:22954
3008433	NTIS, PC A02/MF A01	DE83008433	MN -90i	8:22927
3008435	NTIS, PC A04/MF A01; 1	DE83008435	MN -90d	8:22928
3008436	NTIS, PC A02/MF A01	DE83008436	MN -90g	8:23776
3008444	NTIS, PC A02/MF A01	DE83008444	MN -38	8:24107
3008446	NTIS, PC A03/MF A01; 1	DE83008446	MN -90a	8:22997
3008447	NTIS, PC A02/MF A01	DE83008447	MN -90i	8:22998
3008716	NTIS, PC A19/MF A01; 1	DE83008716	MN -2	8:23442
3008773	NTIS, PC A02/MF A01; 1	DE83008773	MN -92	8:23064
3008921	NTIS, PC A05/MF A01	DE83008921	MN -92a	8:23074
3008922	NTIS, PC A03/MF A01	DE83008922	MN -92a	8:23075
3008923	NTIS, PC A02/MF A01	DE83008923	MN -92a	8:23076
3008953	NTIS, PC A02/MF A01; 1	DE83008953	MN -13	8:25283
DOE/NE-0049	NTIS, PC A04/MF A01	DE83008476	STD -83	8:23112
DOE/NE/34087-T1-Vol.1	NTIS (US Sales Only), PC A16/MF A01	DE82021736	STD -78	8:23448
T1-Vol.2	NTIS (US Sales Only), PC A13/MF A01	DE83001866	STD -78	8:23458
DOE/NV/10249-T1	NTIS, PC A02/MF A01; 1	DE83008764	MN -92a	8:23059
DOE/OR/00099-T1	NTIS MF A01; 2	DE83008984	MN -66b	8:23380
DOE/OR/04940-3	NTIS, PC A04/MF A01; 1	DE83008992	MN -92	8:23039
DOE/PC/40089-T2	NTIS MF A01; 2	DE83009226	MN -90d	8:22929
DOE/PC/40265-6	NTIS, PC A03/MF A01; 1	DE83009312	MN -90e	8:22999
DOE/PE/70044-T6	NTIS, PC A05/MF A01; 1	DE82014298	MN -95d	8:23813
DOE/PETC/TR-83/ 1	NTIS, PC A02/MF A01; 1	DE83009250	STD -90b	8:22987
DOE/R5/10145-T1	NTIS, PC A02/MF A01; 1	DE83009159	MN -95d	8:23814
DOE/R5/10322-2	NTIS, PC A05/MF A01; 1	DE83007667	MN -95d	8:23815
DOE/RA/10722-3	NTIS, PC A02/MF A01; 1	DE83009584	MN -4	8:24527
DOE/RA/12117-3	NTIS, PC A03/MF A01; 1	DE83009353	STD -97e	8:23245
DOE/RA/50362-1395-Vol.2-Pt.1	NTIS, PC A19/MF A01; 1	DE83008565	MN -90c	8:23228
1395-Vol.2-Pt.2	NTIS, PC A17/MF A01; 1	DE83008566	MN -90c	8:23229
1395-Vol.3	NTIS, PC A15/MF A01; 1	DE83008567	MN -90c	8:23230
1395-Vol.5	NTIS, PC A06/MF A01	DE83008569	MN -90c	8:23231
1395-Vol.6	NTIS, PC A19/MF A01	DE83008570	MN -90c	8:23232
1395-Vol.7-App.	NTIS, PC A21/MF A01; 1	DE83008559	MN -90c	8:23233
1395-Vol.7-Pt.1	NTIS, PC A18/MF A01; 1	DE83008571	MN -90c	8:23234
1395-Vol.7-Pt.2	NTIS, PC A16/MF A01; 1	DE83008572	MN -90c	8:23235
1395-Vol.8	NTIS, PC A14/MF A01; 1	DE83008560	MN -90c	8:23236
DOE/RA/50377-2	NTIS MF A01; 2	DE83008482	STD -95e	8:23862
DOE/RG/10268-T3	NTIS, PC A07/MF A01	DE83008950	MN -80	8:23536
T4	NTIS, PC A13/MF A01; 1	DE83009103	MN -92	8:23065
DOE/RL-83-1	NTIS MF A01	DE83007991	STD -85	8:23114
DOE/RL/01830-T9	NTIS, PC A08/MF A01	DE83008256	MN -98G	8:23717
DOE/S-0017	NTIS, PC A03/MF A01	DE83009063	MN -95	8:23707
DOE/SF/01240-T1	NTIS MF A01; 2	DE81029339	MN -93	8:23790
DOE/SF/11109-T15	NTIS, PC A24; 3	DE82011800	ND -62c	8:23303
DOE/SF/11510-T1	NTIS, PC A04/MF A01	DE83008110	MN -59c	8:23816
DOE/SF/70010-T34	NTIS, PC A03; 3	DE82007983	ND -79k	8:23518

Report No.	Availability	Order No.	Distribution Category	Abstract No.
DOE/SR/11018-T1	NTIS, PC A04/MF A01	DE83008553	MN -85	8:23115
DOE/TIC-3339-Suppl.3	NTIS, PC A99/MF A99; 1	DE83009129	STD -77	8:23507
3382-R1	NTIS, PC A08/MF A01; 1	DE83009154	STD -11	8:24233
8200-R44	NTIS, PC A03/MF A01	DE81023785	STD -80	8:23443
11428	NTIS, PC A02/MF A01	DE83009412	MN -90c	8:23221
11476	NTIS, PC A05/MF A01; 1	DE83009130	STD -88	8:22988
11478	NTIS, PC A13/MF A01	DE83009203	STD -88	8:22976
11480	NTIS, PC A03; 3	DE83009204	STD -88	8:22977
11483	NTIS, PC A06/MF A01; 1	DE83009155	STD -88	8:22978
3008728	NTIS, PC A02/MF A01	DE83008728	MN -13	8:25284
3008954	NTIS, PC A02/MF A01	DE83008954	MN -13	8:25285
DOE-tr-22	NTIS, PC A08/MF A01	DE83009411	STD -48	8:24396
109	NTIS, PC A04/MF A01; 1	DE83009131	STD -80	8:23444
DP-1639	NTIS, PC A04/MF A01; 1	DE83009386	STD -11	8:24234
DP-MS-80-115	NTIS, PC A02/MF A01	DE83009413	MN -85	8:23116
DP-tr-37	NTIS MF A01; 2	DE83007886	MN -10	8:23113
EDF-CG-RA-1981	NTIS (US Sales Only), PC A07/MF A01; 1	DE83750419	MN -97b	8:23743
EEC-134	NTIS (US Sales Only), PC A03/MF A01	DE83901475	MN -11	8:24503
EGG-2164-Rev.1	*See* NUREG/CR-2531-Rev.1	DE83008733	MN -78	8:23628
2236	NTIS, PC A04/MF A01	DE83009147	STD -70	8:23123
EGG-EA-5623	*See* NUREG/CR-2771	DE83008766	MN -80	8:23631
EGG-FM-5487	NTIS, PC A05/MF A01	DE83008409	MN -78	8:23495
5667	NTIS, PC A03/MF A01	DE83009197	MN -38	8:24141
6153	NTIS, PC A03/MF A01	DE83009201	MN -70B	8:23124
6187	NTIS, PC A03/MF A01	DE83009191	MN -90h	8:22930
EGG-GTH-6143	NTIS, PC A02/MF A01	DE83009202	MN -66d	8:23381
EGG-TMI-5966-Rev.1	NTIS, PC A05/MF A01	DE83009200	MN -78	8:23607
6181	NTIS, PC A07/MF A01	DE83009199	MN -78	8:23496
6198	NTIS, PC A03/MF A01	DE83009196	MN -78	8:23608
ENICO-1075	*See* NUREG/CR-1894	DE83008251	MN -11	8:24249
EPA-600/ 7-79-098b-Vol.2	NTIS, PC A02/MF A01; 1	DE83007323	MN -90i	8:22992
EPRI-AP-2475	NTIS, PC A07/MF A01	DE83901864	MN -90g	8:23292
2846	NTIS, PC A17/MF A01; 1	DE83009252	MN -90c	8:22931
2854	NTIS, PC A13/MF A01; 1	DE83901856	MN -90c	8:23416
2871-CCM	NTIS, PC A06/MF A01	DE83901852	MN -90f	8:23417
2882	NTIS, PC A16/MF A01	DE83901872	MN -60	8:23391
2882-SY	NTIS, PC A04/MF A01	DE83901865	MN -60	8:23392
2883	NTIS, PC A06/MF A01; 1	DE83901832	MN -90f	8:23418
EPRI-CS-2723	NTIS, PC A05/MF A01; 1	DE83900756	MN -69	8:23877
2885	NTIS, PC A08/MF A01; 1	DE83901861	MN -90i	8:22958
EPRI-EA-1914-Vol.2	NTIS, PC A04/MF A01; 1	DE83901835	MN -11	8:24224
2243	NTIS, PC A07/MF A01; 1	DE83901850	MN -11	8:24225
2827	NTIS, PC A14/MF A01; 1	DE83901460	MN -11	8:24280
2867	NTIS, PC A08/MF A01; 1	DE83009255	MN -90i	8:22955
2880-Vol.1	NTIS, PC A05/MF A01	DE83901833	MN -97	8:23419
2889	NTIS, PC A15/MF A01	DE83901869	MN -11	8:24237
2895	NTIS, PC A04/MF A01; 1	DE83901851	MN -41	8:24481
2904	NTIS, PC A05/MF A01; 1	DE83901831	MN -97b	8:23744
EPRI-EL-2348-Vol.1	NTIS MF A01; 2	DE82903570	MN -97c	8:23434
2834	NTIS, PC A19/MF A01; 1	DE83901838	MN -92	8:23435
2847	NTIS, PC A06/MF A01; 1	DE83901873	MN -97a	8:23436
2870	NTIS, PC A17/MF A01; 1	DE83901858	MN -97a	8:23437
2874	NTIS, PC A07/MF A01	DE83901863	MN -97d	8:23745
2876	NTIS, PC A16/MF A01; 1	DE83901849	MN -97	8:23438
EPRI-EM-2864	NTIS, PC A06/MF A01; 1	DE83901827	MN -94a	8:23702
2886	NTIS, PC A07/MF A01	DE83901822	MN -95f	8:23863
EPRI-NP-1583	NTIS, PC A04 - GPO	DE83901823	MN -78	8:23609
2728-SR	NTIS, PC A17/MF A01; 1	DE83901877	MN -80	8:23464
2745	NTIS, PC A08/MF A01; 1	DE83009251	MN -80	8:23610
2746	NTIS, PC A07/MF A01; 1	DE83901826	MN -80	8:23611
2751	NTIS, PC A05/MF A01	DE83901860	MN -37	8:23420
2789-SR	NTIS, PC A12/MF A01; 1	DE83901837	MN -80	8:23465
2815	NTIS, PC A11/MF A01	DE83901857	MN -78	8:23497
2848	NTIS, PC A08/MF A01; 1	DE83901870	MN -78	8:23498

Report No.	Availability	Order No.	Distribution Category	Abstract No.
2856-CCM	NTIS, PC A07/MF A01; 1	DE83901828	MN -78	8:23612
2872	NTIS, PC A06/MF A01; 1	DE83901875	MN -78	8:23499
2873	NTIS, PC A04/MF A01	DE83901834	MN -80	8:23613
2877	NTIS, PC A12/MF A01; 1	DE83901868	MN -78	8:23500
2887-Vol.1	NTIS, PC A12/MF A01; 1	DE83901871	MN -78	8:23501
2887-Vol.2	NTIS, PC A25/MF A01; 1	DE83901874	MN -78	8:23502
2887-Vol.3	NTIS, PC A99/MF A01; 1	DE83901878	MN -78	8:23503
2898	NTIS, PC A16/MF A01; 1	DE83901859	MN -80	8:23614
2903	NTIS, PC A04/MF A01; 1	DE83901825	MN -78	8:23466
2907-SR	NTIS, PC A05/MF A01	DE83901866	MN -78	8:23615
EPRI-P-				
2851-SR	NTIS, PC A05/MF A01	DE83901830	MN -97	8:23746
ERA-				
80-142	*See* ERATL-83-10			8:23421
ERATL-				
83-10	NTIS PC $85.00			8:23421
ESC-				
18	*See* PB-83-116236			8:23241
EUR-				
6668-EN	NTIS (US Sales Only), MF A01; 2	DE82902428	MN -59	8:23357
6742-FR	NTIS (US Sales Only), PC A05/MF A01; 1	DE82902442	MN -59	8:23321
7018-FR	European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037		ND -61a	8:23271
7058d	*See* KFK-3354	DE83750133	MN -80	8:23620
7265-EN	NTIS PC E05/MF E05			8:23361
7313-FR	*See* PB-83-133785			8:23247
7556-EN	*See* PB-83-133165			8:23273
7595-EN-VOL-2	*See* PB-83-135897			8:23681
7608-EN	*See* PB-83-133413			8:23275
7697-EN	*See* PB-83-133744			8:23665
7698-DE	*See* PB-83-132126			8:23358
7699-EN	*See* PB-83-132134			8:23359
7718-FR	NTIS PC E06/MF E06			8:23371
7801-EN	NTIS PC E05/MF E05			8:23385
7875-FR	European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037		ND -95d	8:23322
8016-FR	European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037		ND -13	8:23204
8037-FR	European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037		ND -94c	8:23205
8054-EN	Luxembourg; Commission of the European Communities (1982).			8:23212
FE-				
2595-7	*See* DOE/ET/12103-T5	DE83008236	MN -90d	8:22921
2893-66	*See* DOE/ET/10069-T6	DE83009157	STD -90d	8:22919
FERMILAB-PUB-				
82/ 92	NTIS, PC A02/MF A01	DE83004260	MN -28	8:24194
FWS/OBS-				
82/ 59	USDI, Fish and Wildlife Service, Washington, DC 20240		MN -11	8:24267
83/ 03	Fish and Wildlife Service, Washington, DC		MN -11	8:23040
GA-A-				
16356	NTIS, PC A18/MF A01; 1	DE83009074	STD -77	8:23538
16845	NTIS, PC A02/MF A01	DE83008457	MN -20b	8:24829
16853	NTIS, PC A02/MF A01	DE83008499	MN -20b	8:24763
GAO/EMD-				
82-122	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -92	8:23724
GCA-TR-				
82-89-G	*See* DOE/EP/12079-T3	DE83007410	MN -11	8:24302
GEAP-				
24941	*See* EPRI-NP-1583	DE83901823	MN -78	8:23609
GEND-				
030-Vol.1	NTIS, PC A08/MF A01; 1	DE83009354	STD -78	8:23504
031	NTIS, PC A04/MF A01; 1	DE83009223	STD -78	8:23616
GJBX-				
376(81)	NTIS, PC A04; 3	DE82011154	ND -51	8:23098
377(81)	NTIS, PC A03; 3	DE82007982	ND -51	8:23099
378-81	NTIS, PC A04; 3	DE82007981	ND -51	8:23100
GKSS-				
80/ E/ 17	NTIS (US Sales Only), PC A03/MF A01	DE83750374	MN -25	8:23954
GREMP-				
13	*See* LBL-11499	DE83009150	STD -66b	8:23373
GRI-				
81/ 0111	*See* ANL/EES-TM-208	DE83008640	MN -61a	8:23257
GSF-OE-				
609	Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg, Germany, F.R.		MN -41	8:24262
GSF-R-				
289	NTIS (US Sales Only), PC A05/MF A01	DE83750305	MN -11	8:24263
GSF-S-				
859	NTIS (US Sales Only), PC A04/MF A01	DE83750307	MN -34D	8:24738
GSF-T-				
137	NTIS (US Sales Only), PC A03/MF A01	DE83750306	MN -70	8:23125
GSI-				
82-4	NTIS (US Sales Only), PC A03/MF A01	DE83750132	MN -34C	8:24705

Report No.	Availability	Order No.	Distribution Category	Abstract No.
HEDL-SA-				
2687-FP	NTIS, PC A03/MF A01; 1	DE83008404	MN -25	8:23955
2700	NTIS, PC A02/MF A01	DE83008402	MN -20c	8:24830
2854	NTIS, PC A03/MF A01; 1	DE83008971	MN -79p	8:23617
HEDL-TME-				
73-51	NTIS, PC A07/MF A01; 1	DE83009821	STD -79c	8:23519
82-28	NTIS, PC A04/MF A01; 1	DE83009719	STD -20	8:24831
HMI-				
373	NTIS (US Sales Only), PC A09/MF A01	DE83780416	MN -34C	8:24642
HRP-				
0904430/ 6	NTIS, PC A04/MF A01			8:24341
0904431/ 4	NTIS, PC A03/MF A01			8:23708
IBRD-WP-				
091	NTIS, PC A05/MF A01			8:23422
IC-				
80/ 98	NTIS (US Sales Only), PC A02/MF A01	DE83700734	MN -34B	8:24504
80/ 100	NTIS (US Sales Only), PC A02/MF A01	DE83700732	MN -34B	8:24505
80/ 130	NTIS (US Sales Only), PC A02/MF A01	DE83700733	MN -34B	8:24506
ICTIS/M-				
0144	Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico			8:22989
0145	Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico			8:22990
0146	Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico			8:22942
0147	Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico			8:22956
0148	Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico			8:22932
0149	Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico			8:22933
0150	Instituto Mexicano de Investigaciones Siderurgicas, Saltillo, Mexico			8:22934
0155	Stichting Energieonderzoek Centrum Nederland, Petten			8:22959
0156	Stichting Energieonderzoek Centrum Nederland, Petten			8:23000
ICTIS/TR-				
20	IEA Coal Research, Technical Information Service, London, England			8:22935
IFSR-				
84	*See* DOE/ET/53088-84	DE83009162	MN -20g	8:24762
IKE-				
6-138	NTIS (US Sales Only), PC A03/MF A01	DE83750127	MN -34C	8:24724
IKE-K-				
71	NTIS (US Sales Only), PC A08/MF A01	DE83750131	MN -95	8:23747
INDC(JAP)-				
76/ L	*See* NEANDC(J)-89/U		ND -34C	8:24643
INFN/TC-				
80/ 8	NTIS (US Sales Only), MF A01; 2	DE82903235	MN -13	8:24145
80/ 10	NTIS (US Sales Only), PC A02; 3	DE82903236	ND -28	8:24203
IPPJ-				
529	NTIS (US Sales Only), PC A02/MF A01	DE83700729	MN -20	8:24832
IS-				
4766	NTIS, PC A08/MF A01; 1	DE83009345	STD -90b	8:22991
ISPO-				
186	*See* LA-9665-MS	DE83009275	STD -15	8:23193
JAERI-M-				
83-025	*See* NEANDC(J)-89/U		ND -34C	8:24643
Juel-				
1774	NTIS (US Sales Only), PC A06/MF A01	DE83750142	MN -34C	8:24725
1783	NTIS (US Sales Only), PC A02/MF A01	DE83750146	MN -59c	8:23352
Juel-Spez-				
65	NTIS (US Sales Only), PC A09/MF A01; 1	DE83750370	MN -59a	8:23817
70(Vol.1)	NTIS (US Sales Only), PC A18/MF A01; 1	DE83750375	MN -97	8:23423
152	NTIS (US Sales Only), PC A04/MF A01	DE83750129	MN -37	8:24204
K/OA-				
5014	NTIS, PC A02/MF A01; 1	DE81025510	MN -15	8:23191
5424	NTIS, PC A02/MF A01; 1	DE83009281	MN -22	8:23103
KFK-				
3250	NTIS (US Sales Only), PC A99/MF A01	DE83750130	MN -80	8:23618
3331	NTIS (US Sales Only), PC A03/MF A01	DE83750145	MN -78	8:23619
3338	NTIS (US Sales Only), PC A06/MF A01	DE83750135	MN -4	8:24060
3354	NTIS (US Sales Only), PC A15/MF A01	DE83750133	MN -80	8:23620
3360	NTIS (US Sales Only), PC A07/MF A01	DE83750141	MN -48	8:24370
3387	NTIS (US Sales Only), PC A03/MF A01	DE83750134	MN -4	8:24049
3402	NTIS (US Sales Only), PC A04/MF A01	DE83750304	MN -34C	8:24715
LA-				
8775-C	NTIS, PC A25/MF A01; 1	DE83006219	STD -34	8:24578
9324-MS	NTIS, PC A04/MF A01; 1	DE83009277	STD -70	8:24485
9427-Vol.1	NTIS, PC A03/MF A01	DE83008739	STD -70	8:23147
9511-C	NTIS, PC A05/MF A01; 1	DE83008275	STD -28	8:24183
9537-MS	NTIS, PC A06/MF A01; 1	DE83008361	STD -28	8:24184
9582-C	NTIS, PC A07/MF A01; 1	DE83004473	STD -34	8:24545
9610-MS	NTIS, PC A04/MF A01; 1	DE83008274	STD -34	8:24726
9617-MS	NTIS MF A01; 2	DE83009373	STD -32	8:25275
9620	NTIS, PC A02/MF A01	DE83009273	STD -45	8:24211

Report No.	Availability	Order No.	Distribution Category	Abstract No.
9633-MS	NTIS, PC A03/MF A01	DE83008272	STD -15	8:23192
9636-MS	NTIS, PC A03/MF A01	DE83008358	STD -34B	8:24508
9646-MS	*See* NUREG/CR-3135	DE83008685	MN -80	8:23551
9650-MS	NTIS, PC A02/MF A01	DE83008282	STD -25	8:24005
9661-MS	NTIS, PC A04/MF A01	DE83008273	STD -98F	8:23007
9665-MS	NTIS, PC A04/MF A01	DE83009275	STD -15	8:23193
9671-HDR	NTIS, PC A02/MF A01	DE83009271	STD -66b	8:23372
9673-PR	NTIS, PC A02/MF A01	DE83008356	STD -33A	8:23202
9679-PR	NTIS, PC A02/MF A01	DE83009274	STD -11	8:24489
LA-tr-				
81-4	NTIS, PC A02/MF A01; 1	DE83009822	MN -20c	8:24021
81-5	NTIS, PC A02/MF A01; 1	DE83009823	MN -20c	8:24020
LA-UR-				
81-2661	NTIS MF A01; 2	DE82000588	MN -28	8:24168
81-2737	NTIS, PC A03/MF A01; 1	DE82000564	MN -45	8:24212
82-3299	NTIS, PC A02/MF A01	DE83003571	MN -34	8:24727
83-117	NTIS, PC A02/MF A01	DE83006053	MN -11	8:24490
83-250	NTIS, PC A03/MF A01; 1	DE83006074	MN -11	8:24491
83-291	NTIS, PC A02/MF A01	DE83007576	MN -21	8:24764
LALP-				
83-4	NTIS, PC A02/MF A01	DE83008283	MN -25	8:23969
LBL-				
11499	NTIS, PC A04/MF A01; 1	DE83009150	STD -66b	8:23373
13091	NTIS, PC A02/MF A01	DE81029858	MN -41	8:24342
13220	NTIS, PC A02/MF A01	DE82000277	MN -34A	8:24741
13588	NTIS, PC A16/MF A01; 1	DE83008397	MN -25	8:23970
14251	NTIS, PC A05/MF A01	DE83008650	STD -95d	8:23818
14748	NTIS, PC A07/MF A01	DE83009059	MN -25	8:23971
15052	NTIS, PC A02/MF A01; 1	DE83008398	MN -70A	8:23148
15199	NTIS, PC A06/MF A01; 1	DE83005707	STD -95d	8:23819
15485	NTIS, PC A03/MF A01	DE83008395	MN -34A	8:24069
15546	NTIS, PC A20/MF A01; 1	DE83009132	MN -94ca	8:23679
MBB-UR-				
453/ 80-OE	NTIS, PC A02/MF A01			8:23304
MDC-H-				
0141	NTIS, PC A21/MF A01; 1	DE83009236	MN -62c	8:23305
MHSMP-				
83-09	NTIS, PC A02/MF A01	DE83007651	MN -45	8:24213
83-10	NTIS, PC A03/MF A01	DE83007770	MN -45	8:24214
MIT-EL-				
82-025-Exec.Summ.	NTIS, PC A02/MF A01	DE83006937	MN -98E	8:23748
MLM-				
3039	NTIS, PC A02/MF A01	DE83009352	STD -25	8:24019
3047	NTIS, PC A02/MF A01	DE83008793	STD -4	8:24050
MPL-U-				
34/ 78	NTIS, PC A03/MF A01; 1	DE83008985	MN -11	8:24156
N-				
82-20829	NTIS, PC A18/MF A01			8:24371
82-20830	NTIS, PC A18/MF A01			8:24372
82-20831	NTIS, PC A18/MF A01			8:24373
82-20835	NTIS, PC A07/MF A01			8:24343
82-21715	NTIS, PC A02/MF A01			8:24006
NASA-CR-				
167538	NTIS, PC A18/MF A01			8:24374
168648	NTIS, PC A02/MF A01			8:24509
168747	NTIS, PC A03/MF A01			8:24238
168757	NTIS, PC A09/MF A01			8:23376
NASA-SP-				
7043(29)	NTIS PC $15.00			8:25286
NASA-TM-				
76652	NTIS, PC A07/MF A01			8:24239
83019	*See* DOE/NASA/10350-35	DE83008176	STD -90f	8:23415
NBL-				
308	NTIS, PC A06/MF A01; 1	DE83009166	MN -15	8:23194
NBS-BSS-				
147	*See* PB-83-122663			8:23325
NCHRP-				
85	Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave, NW, Washington, DC		MN -96	8:23844
NCHSR-				
82-89	*See* PB-83-141903			8:24390
NEANDC(J)-				
89/ U	Japan Atomic Energy Research Inst., Div. of Technical Information, Tokai-mura, Ibaraki-ken		ND -34C	8:24643
NEDC-				
23856-7	*See* DOE/ET/34203-47	DE83009392	STD -78	8:23447
NMERDI-				
2-68-3118	New Mexico Energy Research and Development Inst., 117 Richmond Dr., NE, Albuquerque, NM 87106		MN -90c	8:22960
NMRI-				
82-1	*See* AD-A-122525/9			8:24399
NP-				
2903373	Inst. of Electrodynamics, Kiev, USSR		ND -34A	8:24750
3770029	NTIS (US Sales Only), PC A04/MF A01	DE83770029	MN -13	8:23718
3770030	NTIS (US Sales Only), PC A04/MF A01; 1	DE83770030	MN -97	8:23749

Report No.	Availability	Order No.	Distribution Category	Abstract No.
3770031	NTIS (US Sales Only), PC A03/MF A01; 1	DE83770031	MN -61a	8:23864
3770032	NTIS (US Sales Only), PC A05/MF A01	DE83770032	MN -88	8:22979
3770033	NTIS (US Sales Only), PC A02/MF A01; 1	DE83770033	MN -95	8:23709
3770034	NTIS (US Sales Only), PC A06/MF A01; 1	DE83770034	MN -11	8:24240
3770035	NTIS (US Sales Only), PC A08/MF A01; 1	DE83770035	MN -97c	8:23439
3770036	NTIS (US Sales Only), PC A04/MF A01; 1	DE83770036	MN -41	8:24410
3770037	NTIS (US Sales Only), PC A05/MF A01; 1	DE83770037	MN -48	8:24411
3770038	NTIS (US Sales Only), PC A07/MF A01	DE83770038	MN -92	8:24571
3770039	NTIS (US Sales Only), PC A02/MF A01	DE83770039	MN -98	8:23714
3901402	Bureau of Mines, Washington, DC		MN -88	8:22980
3901669	NTIS, PC A04/MF A01	DE83901669	MN -98G	8:23693
3901670	NTIS, PC A08/MF A01; 1	DE83901670	MN -98G	8:23719
3901672	NTIS, PC A09/MF A01; 1	DE83901672	MN -98F	8:23694
3901855	Publications Dept., National Association of Regulatory Utility Commissioners, P.O. Box 684, Washington, DC		MN -13	8:23720
NBCC-				
18574	National Research Council of Canada, Ottawa, Ontario			8:22961
19903	*See* ARL-TR-30			8:22900
NTISUB/A/024-				
75/ 002	NTIS; 1		MN -62	8:23323
NUREG-				
0020-Vol.6-No.11	NTIS, PC A17/MF A01 - GPO	DE83901552	MN -80	8:23523
0304-Vol.7-No.4	NTIS, PC A23/MF A01 - GPO	DE83901399	MN -80	8:23524
0422-Suppl.6	NTIS, PC A05/MF A01 - GPO $5.50	DE83901688	MN -78	8:23621
0525-Rev.6	NTIS, PC A03/MF A01 - GPO $5.00	DE83901665	MN -15	8:23195
0540-Vol.4-No.12	NTIS, PC A23/MF A01; 1 - GPO	DE83901816	MN -2	8:23525
0580-Vol.12-No.2	NTIS, PC A05/MF A01 - GPO	DE83901511	MN -80	8:23526
0748-Vol.3-No.2	NTIS, PC A13/MF A01; 1 - GPO	DE83901883	MN -2	8:23527
0797-Suppl.3	NTIS, PC A04/MF A01 - GPO $5.00	DE83901525	MN -78	8:23622
0837-Vol.2-No.3	NTIS, PC A09/MF A01 - GPO $7.50	DE83901882	MN -41	8:24264
0857-Suppl.4	NTIS, PC A03/MF A01 - GPO $4.50	DE83901527	MN -78	8:23528
0896	NTIS, PC A99/MF A01; 1 - GPO $14.00	DE83901398	MN -78	8:23623
0907	NTIS, PC A02/MF A01 - GPO $3.25	DE83901526	MN -15	8:23196
0964	NTIS, PC A25/MF A01; 1 - GPO $12.00	DE83901401	MN -78	8:23529
0966	NTIS, PC A07/MF A01 - GPO $6.50	DE83901824	MN -78	8:23624
0968-Vol.1	NTIS, PC A99/MF A01; 1 - GPO $15.00	DE83901819	MN -79p	8:23625
0968-Vol.2-App.	NTIS, PC A16/MF A01; 1 - GPO $9.50	DE83901820	MN -79p	8:23626
NUREG/BR-				
0025-Vol.9-No.2	NTIS, PC A02/MF A01 - GPO	DE83901515	MN -70	8:23149
NUREG/CR-				
0200-Vol.2	NTIS, PC A09/MF A01	DE82016031	MN -15	8:23543
1391	NTIS, PC A04/MF A01	DE83008378	MN -79p	8:23627
1894	NTIS, PC A04/MF A01 - GPO	DE83008251	MN -11	8:24249
2135	*See* EPRI-NP-1583	DE83901823	MN -78	8:23609
2531-Rev.1	NTIS MF A01; 2	DE83008733	MN -78	8:23628
2716-Vol.3	NTIS, PC A05/MF A01; 1 - GPO $5.00	DE83009327	MN -80	8:23549
2728	NTIS, PC A08/MF A01 - GPO	DE83008731	MN -78	8:23629
2744/ 1	NTIS, PC A10/MF A01; 1	DE83008765	MN -80	8:23630
2771	NTIS, PC A09/MF A01 - GPO $7.00	DE83008766	MN -80	8:23631
2854-813-1164D	NTIS, PC A09/MF A01; 1 - GPO $7.00	DE83901896	MN -70	8:23150
2887	NTIS, PC A04/MF A01; 1 - GPO	DE83009369	MN -78	8:23632
2901	NTIS, PC A04/MF A01; 1 - GPO	DE83009337	MN -11	8:23633
2925	NTIS, PC A07/MF A01; 1 - GPO	DE83008184	MN -41	8:23574
2959-813-1165	NTIS, PC A04/MF A01; 1 - GPO $5.00	DE83901818	MN -70	8:23151
3009	NTIS, PC A11/MF A01 - GPO $7.50	DE83007692	MN -78	8:23505
3030	NTIS, PC A03/MF A01; 1 - GPO $4.50	DE83009375	MN -70	8:23152
3063	NTIS, PC A05/MF A01; 1 - GPO	DE83008994	MN -80	8:23550
3065-813-1163-Vol.1	NTIS, PC A10/MF A01; 1 - GPO $7.50	DE83901897	MN -70	8:23153
3065-813-1163-Vol.2	NTIS, PC A99/MF A01; 1 - GPO $13.00	DE83901895	MN -70	8:23154
3074	NTIS, PC A05/MF A01; 1 - GPO	DE83008734	MN -80	8:23634
3114	NTIS, PC A10/MF A01; 1 - GPO	DE83006002	MN -80	8:23556
3116	NTIS, PC A03/MF A01; 1 - GPO $4.75	DE83901891	MN -80	8:23530
3130	NTIS, PC A15/MF A01; 1 - GPO $8.50	DE83901512	MN -70B	8:23184
3135	NTIS, PC A03/MF A01	DE83008685	MN -80	8:23551
3144	NTIS, PC A10/MF A01; 1 - GPO $8.00	DE83901403	MN -70B	8:23155
3145-Vol.1	NTIS, PC A06/MF A01; 1 - GPO $5.50	DE83901400	MN -11	8:24492
3167	NTIS, PC A04/MF A01 - GPO	DE83008459	MN -78	8:23635
3212	NTIS, PC A07/MF A01; 1 - GPO $6.50	DE83901848	MN -78	8:23636
NYSERDA-				
82-31	NYSERDA, Two Rockefeller Plaza, Albany, NY 12223		MN -60	8:23389
82-33	NTIS, PC A04/MF A01; 1	DE83901881	MN -95d	8:23825
ONWI-				
9(82-2)	NTIS, PC A09/MF A01	DE83008477	MN -70	8:23156
266	NTIS, PC A18/MF A01; 1	DE83008610	MN -70	8:24303
424	NTIS, PC A07/MF A01; 1	DE83009224	MN -70	8:23188
ORAU/IEA-				
83-2(M)	NTIS, PC A05/MF A01; 1	DE83008191	MN -80	8:23637
ORC-				
82-9	*See* AD-A-122599/4			8:24307
ORNL-				
5944	NTIS, PC A13/MF A01; 1	DE83008792	STD -90d	8:22898
ORNL/NUREG/CSD-				
2-V2	*See* NUREG/CR-0200-Vol.2	DE82016031	MN -15	8:23543
ORNL/Sub-				
79/ 21453/ 13	NTIS, PC A06/MF A01	DE83008554	MN -38	8:24836

Report No.	Availability	Order No.	Distribution Category	Abstract No.
ORNL/TM-				
8614	*See* NUREG/CR-3114	DE83006002	MN -80	8:23556
ORNL-tr-				
4929	NTIS, PC A02/MF A01; 1	DE83003853	MN -25	8:23989
4959	NTIS, PC A02/MF A01; 1	DE83007180	MN -25	8:23990
4968	NTIS, PC A01/MF A01; 1	DE83008579	MN -80	8:23553
ORO-				
4703-37	*See* DOE/EV/04703-37	DE83008777	MN -34A	8:24523
4703-38	*See* DOE/EV/04703-38	DE83008780	MN -34A	8:24524
4703-39	*See* DOE/EV/04703-39	DE83008779	MN -34A	8:24525
P-				
400-82-065	California Energy Commission, 1516 Ninth St., Sacramento, CA		MN -98B	8:23725
PATENTS-DE-	(German (F.R.): Deutsches Patentamt, Schriftenvertrieb, Gitschizer Str. 97-103, 1000 Berlin 60, F.R. Germany, DM 4.50- per copy, plus postage)			
3,007,814/ A/				8:24347
3,031,458/ A/				8:24346
PATENTS-US-	(US: Commissioner of Patents, Washington, D.C. 20231, USA, $1.00 per copy. Government Patent Applications available from NTIS)			
A A6-279443				8:24338
A6-423402				8:23239
4,366,860				8:23021
4,367,159				8:23683
4,367,184				8:23107
4,367,194				8:23521
4,367,628				8:23425
4,368,640				8:23506
4,369,893				8:23520
4,370,576				8:23753
4,371,045				8:23020
4,371,705				8:24071
4,372,376				8:23360
4,372,853				8:23552
4,373,454				8:23083
4,374,002				8:23976
A 6-403,838				8:23287
PB-				
82-922919	NTIS PC $5.25/MF $3.00			8:24322
83-101667	NTIS, PC A$25.00/MF $25.00			8:23680
83-115220	NTIS, PC A15/MF A01		MN -92	8:23036
83-116236	NTIS, PC A05/MF A01			8:23241
83-119610	NTIS, PC A07/MF A01			8:23324
83-120147	NTIS, PC A06/MF A01			8:24109
83-122663	NTIS, PC A11/MF A01			8:23325
83-124586	NTIS, PC A09/MF A01			8:22962
83-124636	NTIS, PC A06/MF A01			8:22963
83-125294	NTIS, PC A02/MF A01			8:22981
83-125617	NTIS, PC A03/MF A01			8:23715
83-126292	NTIS, PC A11/MF A01			8:24152
83-127563	NTIS, PC A03/MF A01			8:23878
83-128116	NTIS, PC A02/MF A01			8:24153
83-128959	NTIS PC E04/MF E04			8:23222
83-129031	NTIS PC E03/MF E03			8:23759
83-131102	NTIS, PC A10/MF A01			8:23009
83-132126	NTIS PC E03/MF E03			8:23358
83-132134	NTIS PC E04/MF E04			8:23359
83-132225	NTIS PC E12/MF E12			8:23223
83-132233	NTIS PC E06/MF E06			8:23206
83-132407	NTIS PC E03/MF E03			8:23224
83-132928	NTIS PC E05/MF E05			8:23207
83-133116	NTIS PC E04/MF E04			8:23272
83-133124	NTIS PC E03/MF E03			8:23225
83-133157	NTIS PC E04/MF E04			8:23226
83-133165	NTIS PC E04/MF E04			8:23273
83-133280	NTIS PC E06/MF E06			8:23208
83-133306	NTIS PC E06/MF E06			8:24479
83-133348	NTIS PC E05/MF E05			8:23209
83-133405	NTIS PC E06/MF E06			8:23274
83-133413	NTIS PC E04/MF E04			8:23275
83-133744	NTIS PC E06/MF E06			8:23665
83-133785	NTIS PC E10/MF E10			8:23247
83-133835	NTIS PC E06/MF E06			8:23374
83-133868	NTIS PC E03/MF E03			8:23276
83-134767	NTIS, PC A06/MF A01			8:24453
83-135095	Pub. in Proceedings of the ASME Solar Energy Division Annual Conference (4th), Albuquerque, New Mexico, 26-29, 1982, p501-510.			8:23353
83-135400	NTIS, PC A03/MF A01			8:24257
83-135574	NTIS, PC AE03/MF E03			8:23865
83-135897	NTIS PC E11/MF E11			8:23681
83-136218	NTIS, PC A04/MF A01			8:24154
83-136358	NTIS, PC A10/MF A01			8:23097
83-136978	NTIS, PC A02/MF A01			8:23791

Report No.	Availability	Order No.	Distribution Category	Abstract No.
83-137380	NTIS, PC A04/MF A01			8:23277
83-138172	NTIS, PC A06/MF A01			8:24258
83-138859	NTIS, PC A03/MF A01			8:23101
83-138909	NTIS, PC A03/MF A01			8:23278
83-139394	NTIS, PC A05/MF A01			8:23157
83-139410	NTIS, PC A03/MF A01			8:23010
83-139428	NTIS, PC A02/MF A01			8:24389
83-139519	NTIS, PC A04/MF A01			8:23037
83-140129	NTIS, PC A03/MF A01			8:23237
83-140228	NTIS PC E06/MF E06			8:23757
83-140392	NTIS, PC A05/MF A01			8:23011
83-141903	NTIS, PC A04/MF A01			8:24390
83-141911	NTIS, PC A02/MF A01			8:24344
83-142547	NTIS, PC A03/MF A01			8:23792
83-142570	NTIS, PC A04/MF A01			8:23309
83-142695	NTIS, PC A04/MF A01			8:23242
83-143818	National Bureau of Standards, Washington, DC			8:24728
83-144006	NTIS, PC A11/MF A01			8:23081
83-144063	NTIS, PC A03/MF A01			8:22964
83-144329	NTIS PC E06/MF E06			8:23210
83-144857	NTIS, PC A04/MF A01			8:23014
83-145003	NTIS, PC A02/MF A01			8:24454
83-145128	NTIS, PC A04/MF A01			8:24265
83-145433	NTIS, PC A02/MF A01			8:23826
83-146142	NTIS, PC A03/MF A01			8:24290
83-146175	NTIS, PC A03/MF A01			8:24051
83-146209	NTIS, PC A07/MF A01			8:24241
83-146308	NTIS, PC A20/MF A01			8:23238
83-146654	NTIS, PC A03/MF A01			8:23760
83-146993	NTIS, PC A03/MF A01			8:24304
83-147009	NTIS, PC A11/MF A01			8:24305
83-147348	NTIS, PC A03/MF A01			8:24398
83-147371	NTIS, PC A03/MF A01			8:23041
83-147447	NTIS, PC A07/MF A01			8:24480
83-147892	NTIS, PC A08/MF A01			8:23185
83-148221	NTIS, PC A09/MF A01			8:22965
83-148379	NTIS, PC A09/MF A01			8:22957
83-148452	NTIS, PC A04/MF A01			8:23019
83-149781	NTIS, PC A08/MF A01			8:23424
83-154153	NTIS, PC A12/MF A01			8:23186
PNL-				
3000-8	NTIS, PC A07/MF A01; 1	DE83009153	STD -70	8:23158
3172	NTIS, PC A04/MF A01; 1	DE83008755	MN -70	8:23159
3938	*See* DOE/ET/20316-81-1	DE83007037	STD -60	8:23388
4275-3	*See* NUREG/CR-2716-Vol.3	DE83009327	MN -80	8:23549
4318	NTIS, PC A11/MF A01; 1	DE83008756	MN -60	8:23394
4390	NTIS, PC A06/MF A01; 1	DE83009062	MN -94e	8:23666
4396	NTIS, PC A04/MF A01	DE83009474	MN -62b	8:23306
4423	NTIS, PC A04/MF A01	DE83008721	MN -70	8:23160
4436	NTIS, PC A04/MF A01	DE83009348	MN -70	8:23161
4460	NTIS, PC A05/MF A01	DE83009114	MN -94e	8:23659
4524	*See* NUREG/CR-3030	DE83009375	MN -70	8:23152
4527	NTIS, PC A04/MF A01	DE83008426	MN -97e	8:24270
4625	NTIS, PC A12/MF A01; 1	DE83008719	MN -85	8:23162
4637	NTIS, PC A05/MF A01	DE83008556	MN -70	8:23163
4639	NTIS, PC A03/MF A01; 1	DE83009470	MN -94e	8:23660
PNL-SA-				
8775	NTIS, PC A02/MF A01; 1	DE83002658	MN -11	8:24271
9511	NTIS, PC A02/MF A01; 1	DE83007573	MN -25	8:24142
9530-Pt.1	NTIS, PC A04/MF A01	DE83007702	MN -12	8:24110
9637	NTIS, PC A02/MF A01	DE81029160	MN -70A	8:23164
9829	NTIS, PC A02/MF A01; 1	DE81030297	MN -70	8:23165
10777	NTIS, PC A02/MF A01	DE83008238	MN -70	8:23166
10780	NTIS, PC A02/MF A01; 1	DE83007391	MN -70	8:23167
10800	NTIS, PC A02/MF A01	DE83007859	MN -70	8:23168
10829	NTIS, PC A02/MF A01	DE83007876	MN -70	8:23169
10832	NTIS, PC A02/MF A01	DE83007836	MN -70	8:23170
10933	NTIS, PC A02/MF A01	DE83007687	MN -61a	8:23279
10964	NTIS, PC A02/MF A01	DE83007838	MN -41	8:24391
11144	NTIS, PC A02/MF A01	DE83007696	MN -70	8:23171
11151	NTIS, PC A02/MF A01; 1	DE83008438	MN -4	8:24052
11163	NTIS, PC A02/MF A01	DE83007875	MN -70	8:23105
11174	NTIS, PC A02/MF A01	DE83007837	MN -70	8:23172
11179	NTIS, PC A02/MF A01	DE83008242	MN -70	8:23173
11182	NTIS, PC A02/MF A01; 1	DE83007652	MN -11	8:24291
PPPL-				
1772	NTIS, PC A02/MF A01	DE83009152	STD -20	8:24765
1977	NTIS, PC A03/MF A01	DE83008981	STD -20f	8:24766
1980	NTIS, PC A03/MF A01	DE83008980	STD -20g	8:24767
1982	NTIS, PC A03/MF A01	DE83008979	STD -20g	8:24768
1983	NTIS, PC A02/MF A01	DE83008978	STD -20f	8:24769
1985	NTIS, PC A02/MF A01	DE83007970	STD -20f	8:24770
1986	NTIS, PC A02/MF A01	DE83008972	STD -20g	8:24771
1989	NTIS, PC A02/MF A01	DE83008982	STD -20g	8:24772

Report No.	Availability	Order No.	Distribution Category	Abstract No.
RAND/N-				
1709-DOE	NTIS, PC A07/MF A01; 1	DE83008161	MN -13	8:23790
REG/G-				
3.46	NTIS, PC A03/MF A01 - GPO	DE83900927	MN -51	8:23102
RFP-				
3032/ 1	NTIS, PC A02; 3	DE82011535	ND -60	8:23395
RFP-Trans-				
378	NTIS, PC A02/MF A01	DE83008677	MN -38	8:24054
379	NTIS, PC A02/MF A01	DE83008676	MN -38	8:23975
382	NTIS, PC A02/MF A01	DE83008678	MN -38	8:24147
383	NTIS, PC A02/MF A01; 1	DE83008679	MN -38	8:24023
384	NTIS, PC A02/MF A01	DE83003158	MN -38	8:24146
391	NTIS MF A01; 2	DE83008680	MN -10	8:24053
393	NTIS, PC A02/MF A01	DE83009331	MN -38	8:24130
394	NTIS, MF03/MF A01; 1	DE83008675	MN -4	8:24070
RHO-BW-SA-				
219-P	NTIS, PC A02/MF A01	DE83008328	MN -70	8:23174
RHO-BW-ST-				
46P	NTIS, PC A03/MF A01	DE83008993	MN -70	8:23175
Rijnhuizen-				
82-140	NTIS (US Sales Only), PC A02/MF A01	DE83700730	MN -20	8:24773
82-142	NTIS (US Sales Only), PC A02/MF A01	DE83700731	MN -20	8:24837
RTD-				
242	*See* AD-A-121033/5			8:23397
SAI-				
82-504-WA	*See* AD-A-122204/1			8:24360
254-83-386-LJ	NTIS, PC A02/MF A01	DE83009112	STD -20g	8:24774
SAN-				
1240-1	*See* DOE/SF/01240-T1	DE81029339	MN -93	8:23790
SAND-				
78-2347	*See* NUREG/CR-3009	DE83007692	MN -78	8:23505
79-2291	NTIS, PC A04/MF A01; 1	DE83008976	STD -71	8:24111
80-0822	*See* NUREG/CR-1391	DE83008378	MN -79p	8:23627
81-1295	NTIS MF A01; 2	DE83009391	STD -71	8:24112
81-7088/ 14	NTIS, PC A03/MF A01; 1	DE83009177	MN -63d	8:23293
81-7088/ 15	NTIS, PC A03/MF A01; 1	DE83009176	MN -63d	8:23294
81-7088/ 16	NTIS, PC A03/MF A01; 1	DE83009178	MN -63d	8:23295
82-0695	NTIS, PC A03/MF A01; 1	DE83009220	MN -94ca	8:23682
82-0852	NTIS, PC A06/MF A01; 1	DE83009146	STD -71	8:24113
82-0899C	NTIS MF A01; 2	DE83005191	MN -66b	8:23382
82-1100	*See* NUREG/CR-2728	DE83008731	MN -78	8:23629
82-1269C	NTIS, PC A02/MF A01; 1	DE82017025	MN -21	8:24775
82-1693	*See* NUREG/CR-2901	DE83009337	MN -11	8:23633
82-1821	NTIS, PC A03/MF A01	DE83009179	MN -28	8:24729
82-2004	*See* NUREG/CR-2925	DE83008184	MN -41	8:23574
82-2227-Vol.7-No.1	NTIS, PC A03/MF A01; 1	DE83008166	MN -13	8:23882
82-2373	NTIS, PC A04/MF A01	DE83009221	MN -13	8:24493
82-2453C	NTIS, PC A02/MF A01; 1	DE83009165	MN -28	8:24185
82-2469	NTIS, PC A05/MF A01; 1	DE83008424	MN -34	8:24007
82-2495	NTIS, PC A02/MF A01	DE83009216	MN -90d	8:22936
82-2681	NTIS MF A01; 2	DE83007990	STD -71	8:23117
82-2699	NTIS, PC A03/MF A01; 1	DE83008977	STD -91	8:23082
82-2730	*See* NUREG/CR-3063	DE83008994	MN -80	8:23550
82-2894	*See* NUREG/CR-2887	DE83009369	MN -78	8:23632
82-2975C	NTIS, PC A02/MF A01	DE83008454	MN -32	8:25276
82-7057/ 1	*See* NUREG/CR-2744/1	DE83008765	MN -80	8:23630
82-7203	NTIS, PC A04/MF A01	DE83009393	STD -66c	8:23383
82-7211	NTIS, PC A05/MF A01; 1	DE83009389	MN -60	8:23396
82-8057	NTIS PC E04/MF A01	DE83008723	MN -62d	8:23307
82-8894	NTIS, PC A03/MF A01	DE83008414	MN -11	8:24242
83-0041	NTIS, PC A02/MF A01	DE83009390	MN -32	8:25277
83-0083	NTIS, PC A04/MF A01	DE83009387	MN -91	8:23077
83-0132	NTIS, PC A03/MF A01; 1	DE83009384	MN -32	8:25278
83-0287	NTIS, PC A03/MF A01; 1	DE83009473	MN -92a	8:23060
83-0474c	NTIS, PC A02/MF A01; 1	DE83007940	MN -11	8:24500
83-0514C	NTIS, PC A02/MF A01; 1	DE83009193	MN -28	8:24186
83-0558C	NTIS, PC A02/MF A01; 1	DE83007710	MN -28	8:24169
83-0628C	NTIS, PC A02/MF A01; 1	DE83009185	MN -28	8:24187
83-0649C	NTIS, PC A02/MF A01; 1	DE83009163	MN -28	8:24188
83-8202	NTIS, PC A05/MF A01; 1	DE83009359	MN -62c	8:23253
83-8209	NTIS, PC A03/MF A01	DE83009358	MN -32	8:24137
SERI/PR-				
9079-1-T6	NTIS, PC A03/MF A01; 1	DE82009312	MN -63	8:23280
SERI/STR-				
211-1827	NTIS, PC A14/MF A01; 1	DE83009715	MN -58e	8:23761
SERI/TP-				
254-1492	NTIS, PC A02; 3	DE82010089	ND -59c	8:23326
254-1801	NTIS, PC A02/MF A001; 1	DE83008468	MN -58	8:23827
254-1802	NTIS, PC A02/MF A01; 1	DE83009182	MN -58	8:23828
SERI/TR-				
215-1598	NTIS, PC A03/MF A01; 1	DE83008478	MN -63	8:23281
SETEC-MME-				
83-004	*See* DOE/ER/10915-2	DE83008763	MN -25	8:24003
SEU-				
83/ 1	NTIS		STD -58	8:23246

Report No.	Availability	Order No.	Distribution Category	Abstract No.
SOLAR/0010-				
79/06	NTIS, PC A11/MF A01; 1	DE83008831	STD -59	8:23248
79/08	NTIS, PC A04/MF A01; 2	DE83008832	STD -59	8:23249
79/10	NTIS, PC A09/MF A01; 1	DE83008847	STD -59	8:23250
79/11	NTIS, PC A08/MF A01	DE83008833	STD -59	8:23251
SOLAR/0017-				
79/34	NTIS, PC A08/MF A01; 1	DE83008834	STD -59	8:23327
SOLAR/0023-				
79/40	NTIS, PC A03/MF A01	DE83008848	STD -59	8:23328
SOLAR/0025-				
79/42	NTIS, PC A03/MF A01	DE83008830	STD -59	8:23329
SOLAR/1002-				
79/14	NTIS, PC A04/MF A01; 1	DE83008849	STD -59	8:23330
SOLAR/1013-				
79/14	NTIS, PC A04/MF A01; 1	DE83008837	STD -59	8:23331
SOLAR/1015-				
79/14	NTIS, PC A04/MF A01; 1	DE83008838	STD -59	8:23332
SOLAR/1034-				
79/14	NTIS, PC A04/MF A01	DE83008839	STD -59	8:23333
SOLAR/1043-				
79/14	NTIS, PC A04/MF A01; 1	DE83008829	STD -59	8:23334
SOLAR/1045-				
79/14	NTIS, PC A04/MF A01; 1	DE83008840	STD -59	8:23335
SOLAR/1046-				
79/14	NTIS, PC A03/MF A01	DE83008828	STD -59	8:23336
SOLAR/1051-				
79/14	NTIS, PC A04/MF A01; 1	DE83008827	STD -59	8:23337
SOLAR/1087-				
79/14	NTIS, PC A04/MF A01; 1	DE83008841	STD -59	8:23338
SOLAR/2003-				
79/14	NTIS, PC A05/MF A01; 1	DE83008826	STD -59	8:23339
SOLAR/2009-				
79/14	NTIS, PC A05/MF A01; 1	DE83008846	STD -59	8:23340
SOLAR/2011-				
79/14	NTIS, PC A04/MF A01; 1	DE83008835	STD -59	8:23341
SOLAR/2014-				
79/14	NTIS, PC A04/MF A01; 1	DE83008844	STD -59	8:23342
SOLAR/2018-				
79/14	NTIS, PC A04/MF A01; 1	DE83008845	STD -59	8:23343
SOLAR/2021-				
79/14	NTIS, PC A04/MF A01; 1	DE83008843	STD -59	8:23344
SOLAR/2036-				
79/14	NTIS, PC A04/MF A01; 1	DE83008825	STD -59	8:23345
SOLAR/2041-				
79/14	NTIS, PC A04/MF A01; 1	DE83008842	STD -59	8:23346
79/60	NTIS, PC A03/MF A01	DE83008836	STD -59	8:23347
SOLAR/2048-				
79/14	NTIS, PC A04/MF A01; 1	DE83008824	STD -59	8:23348
SP-MET-				
1979:2	NTIS, PC A03/MF A01			8:23354
SRC-TR-				
81-524	*See* PB-83-147009			8:24305
81-524-SUM	*See* PB-83-146993			8:24304
TAC/ST-				
75-603	*See* NTISUB/A/024-75/002		MN -62	8:23323
TID-				
7029	NTIS, PC A18/MF A01	DE83008143	MN -10	8:23197
TTC-				
0399	*See* SAND-82-2681	DE83007990	STD -71	8:23117
TVA/ONR/LFR-				
82/8	NTIS, PC A04/MF A01	DE83901679	MN -11	8:24354
83/5	NTIS, PC A03/MF A01	DE83901678	MN -11	8:24355
83/7	NTIS, PC A02/MF A01	DE83901677	MN -11	8:24356
TVA/OP/ECR-				
82/42	NTIS, PC A06/MF A01; 1	DE83901685	MN -98G	8:23710
TVA/OP/EDT-				
83/3	NTIS, PC A06/MF A01	DE83901683	MN -4	8:23038
TVA/OP/EUDR-				
83/3	NTIS, PC A03/MF A01	DE83901687	MN -98E	8:23752
TVA/OP/OPS-				
83/1	NTIS, PC A03/MF A01; 1	DE83901682	MN -37	8:23440
TVA/PUB-				
83/29	*See* SAND-82-8894	DE83008414	MN -11	8:24242
UCID-				
19305	NTIS, PC A03/MF A01	DE83008419	MN -35	8:24220
19473	NTIS, PC A04/MF A01; 1	DE83009172	MN -15	8:23638
19474	NTIS, PC A02/MF A01	DE83009218	MN -97b	8:23467
19475	NTIS, PC A03/MF A01	DE83009219	MN -97b	8:23567
19638	NTIS, PC A24/MF A01; 1	DE83008737	MN -20c	8:24838
19663	NTIS, PC A17/MF A01; 1	DE83008408	MN -25	8:24008
19677	NTIS, PC A06/MF A01; 1	DE83008177	MN -38	8:24143
19681	NTIS, PC A02/MF A01	DE83009356	MN -32	8:25279
19700	NTIS, PC A04/MF A01	DE83009217	MN -97b	8:23568
19701	NTIS, PC A02/MF A01	DE83009111	MN -97b	8:23531
19702	NTIS, PC A03/MF A01	DE83009180	MN -15	8:23569

Report No.	Availability	Order No.	Distribution Category	Abstract No.
19727	NTIS, PC A02/MF A01	DE83008442	MN -25	8:24033
19735	NTIS, PC A02/MF A01	DE83008440	MN -34D	8:24215
19740	NTIS, PC A02/MF A01; 1	DE83009173	MN -33	8:24216
19741	NTIS, PC A03/MF A01	DE83009174	MN -34A	8:24546
19748	NTIS, PC A07/MF A01; 1	DE83009113	MN -37	8:24839
UCRL-				
15520	NTIS, PC A15/MF A01; 1	DE83009328	MN -11	8:24494
15521-Vol.1	NTIS, PC A16/MF A01; 1	DE83009324	MN -20d	8:24840
15521-Vol.2	NTIS, PC A13/MF A01	DE83009322	MN -20d	8:24841
52000-83-1	NTIS, PC A03/MF A01; 1	DE83009213	STD -2	8:24842
53150	NTIS, PC A04/MF A01; 1	DE83009171	STD -45	8:24217
53288	NTIS, PC A10/MF A01; 1	DE82015994	MN -11	8:24243
53311	NTIS, PC A02/MF A01; 1	DE83008439	STD -41	8:24244
53344-Vol.4	NTIS, PC A05/MF A01	DE83009211	STD -21	8:24844
53369-Vol.1	NTIS MF A01; 2	DE83009100	STD -46	8:23544
53369-Vol.2	NTIS MF A01; 2	DE83009210	STD -46	8:23545
53377	NTIS, PC A02/MF A01; 1	DE83009212	STD -70	8:24114
53383	NTIS, PC A02/MF A01	DE83008724	STD -92b	8:23068
53393	NTIS, PC A07/MF A01; 1	DE83009181	MN -35	8:24218
85986	NTIS, PC A02; 3	DE82012751	ND -20b	8:24845
88167	NTIS, PC A02/MF A01; 1	DE83009243	MN -22	8:23176
88222	NTIS, PC A02/MF A01	DE83009117	MN -20e	8:24846
88283	NTIS, PC A02/MF A01; 1	DE83009238	MN -28	8:24189
88562	NTIS, PC A02/MF A01	DE83008593	MN -20d	8:24776
88780	NTIS, PC A02/MF A01; 1	DE83008406	MN -92a	8:23069
88781	NTIS, PC A02/MF A01	DE83008405	MN -92a	8:23070
88782	NTIS, PC A02/MF A01; 1	DE83008407	MN -92a	8:23071
88812	NTIS, PC A03/MF A01	DE83009247	MN -11	8:24295
88867	NTIS, PC A03/MF A01	DE83009241	MN -12	8:23429
88904	NTIS, PC A02/MF A01	DE83009242	MN -13	8:25232
88908	NTIS, PC A03/MF A01; 1	DE83009245	MN -92b	8:23086
USGS/MAP/MF-				
1312	Geological Survey, Federal Center, Box 25286, Denver, CO 80225		MN -98A	8:22966
USGS-OFR-				
80-938	NTIS, PC A03/MF A01; 1	DE83009265	MN -92a	8:23061
81-181	NTIS, PC A04/MF A01	DE83009061	MN -92a	8:23062
UWFDM-				
433	*See* DOE/ET/52048-19	DE82000907	STD -20	8:24827

ORDER NUMBER CORRELATION

This correlation list is provided for those organizations where document storage is alphanumeric by report number and request may be received by order number. For other information about a document (abstract number, distribution category, availability, and price), please refer to the Report Number Index.

Order No.	*Report No.*
DE81023785	DOE/TIC—8200-R44
DE81025510	K/OA—5014
DE81029160	PNL-SA—9637
DE81029339	DOE/SF/01240—T1
DE81029858	LBL—13091
DE81030297	PNL-SA—9829
DE81030939	DOE/ER/01198—1363
DE81903609	CONF-800814—34
DE82000277	LBL—13220
DE82000564	LA-UR—81-2737
DE82000588	LA-UR—81-2661
DE82000593	DOE/ER/40033—8
DE82000663	DOE/ET/20279—156
DE82000664	DOE/ET/20279—157
DE82000665	DOE/ER/40033—9
DE82000907	DOE/ET/52048—19
DE82007981	GJBX—378-81
DE82007982	GJBX—377(81)
DE82007983	DOE/SF/70010—T34
DE82008303	DOE/ER/70004—297
DE82008305	DOE/ER/70004—295
DE82008308	DOE/ER/70004—290
DE82009312	SERI/PR—9079-1-T6
DE82010089	SERI/TP—254-1492
DE82010798	DOE/EV/00902—34
DE82011154	GJBX—376(81)
DE82011513	CONF-820134—1
DE82011535	RFP—3032/1
DE82011800	DOE/SF/11109—T15
DE82012751	UCRL—85986
DE82014212	DOE/CS/30013—T7
DE82014298	DOE/PE/70044—T6
DE82015994	UCRL—53288
DE82016031	NUREG/CR—0200-Vol.2
DE82017025	SAND—82-1269C
DE82020511	DOE/ER/70064—T1
DE82021736	DOE/NE/34087—T1-Vol.1
DE82902428	EUR—6668-EN
DE82902442	EUR—6742-FR
DE82903105	CNEN-RT/ING—(81)15
DE82903235	INFN/TC—80/8
DE82903236	INFN/TC—80/10
DE82903570	EPRI-EL—2348-Vol.1
DE82904743	CONF-8003176—
DE83001866	DOE/NE/34087—T1-Vol.2
DE83002658	PNL-SA—8775
DE83002971	DOE/EIS—0097
DE83003033	DOE/MC/14693—1296-Vol.1
DE83003035	DOE/MC/14693—1296-Vol.2
DE83003138	DOE/NBM—3003138
DE83003158	RFP-Trans—384
DE83003571	LA-UR—82-3299
DE83003853	ORNL-tr—4929
DE83004260	FERMILAB-PUB—82/92
DE83004473	LA—9582-C
DE83004846	DOE/ET/10159—T24
DE83005191	SAND—82-0899C
DE83005483	DOE/CS/30127—T1
DE83005592	DOE/LC/RI—83-2
DE83005594	DOE/MC/16528—1328
DE83005617	DOE/ET/14236—1
DE83005618	DOE/ET/14236—2
DE83005693	DOE/CS/22804—T6
DE83005707	LBL—15199
DE83005896	DOE/ET/11056—T7
DE83006002	NUREG/CR—3114
DE83006053	LA-UR—83-117
DE83006074	LA-UR—83-250
DE83006125	DOE/IG—103
DE83006126	DOE/IG—104
DE83006127	DOE/IG—105
DE83006130	DOE/IG—109
DE83006131	DOE/IG—110
DE83006219	LA—8775-C
DE83006310	DOE/IG—111
DE83006311	DOE/IG—112
DE83006314	DOE/IG—116
DE83006315	DOE/IG—117
DE83006316	DOE/IG—118
DE83006317	DOE/IG—119
DE83006318	DOE/IG—120
DE83006319	DOE/IG—121
DE83006320	DOE/IG—122
DE83006321	DOE/IG—123
DE83006322	DOE/IG—124
DE83006323	DOE/IG—125
DE83006498	DOE/IG—115
DE83006591	DOE/ET/12188—1
DE83006616	DOE/BC/10467—13
DE83006617	DOE/BC/10467—12
DE83006618	DOE/BC/10467—11
DE83006619	BDX—613-2903
DE83006625	DOE/IG—133
DE83006712	DOE/ET/10143—T36
DE83006713	DOE/ET/10143—T35
DE83006907	DOE/MC/08339—1348
DE83006929	DOE/IG—0189
DE83006937	MIT-EL—82-025-Exec.Summ.
DE83006959	DOE/AL/22028—T1
DE83006975	DOE/EV/04326—4
DE83007037	DOE/ET/20316—81-1
DE83007109	DOE/ER/10645—10-Pt.1
DE83007180	ORNL-tr—4959
DE83007206	DOE/MC/14600—T1
DE83007321	DOE/ER/10645—8
DE83007323	EPA—600/7-79-098b-Vol.2
DE83007387	BNL—32503
DE83007391	PNL-SA—10780
DE83007410	DOE/EP/12079—T3
DE83007421	DOE/ER/40017—4
DE83007511	CONF-820220—2
DE83007513	CONF-820205—6
DE83007514	CONF-820275—1
DE83007573	PNL-SA—9511
DE83007576	LA-UR—83-291
DE83007589	CONF-820659—6
DE83007592	CONF-810347—6
DE83007598	DOE/EI/11865—T1-Vol.1
DE83007608	CONF-820659—8
DE83007616	DOE/EIS—0089-Add.
DE83007620	CONF-820322—4
DE83007623	CONF-820434—19
DE83007624	CONF-820627—14
DE83007626	CONF-820605—27
DE83007627	CONF-820274—3
DE83007628	CONF-820274—2
DE83007639	DOE/ID/12206—2
DE83007640	CONF-820128—7
DE83007641	CONF-821176—1
DE83007644	CONF-811040—201
DE83007649	CONF-811150—14
DE83007651	MHSMP—83-09
DE83007652	PNL-SA—11182
DE83007663	DOE/EIA—0226(81/11)
DE83007664	CONF-8209106—1
DE83007667	DOE/R5/10322—2
DE83007669	CONF-820548—6
DE83007670	CONF-820508—8
DE83007673	DOE/ID/12206—1
DE83007676	CONF-8206162—1
DE83007678	CONF-820628—22
DE83007687	PNL-SA—10933
DE83007688	DOE/EI/11865—T1-Vol.4
DE83007689	CONF-811150—18
DE83007692	NUREG/CR—3009
DE83007693	DOE/ET/10815—61
DE83007694	CONF-810631—8
DE83007696	PNL-SA—11144
DE83007702	PNL-SA—9530-Pt.1
DE83007709	CONF-8209101—3
DE83007710	SAND—83-0558C
DE83007719	CONF-8209105—1
DE83007720	CONF-821045—3
DE83007721	CONF-820962—4
DE83007739	DOE/NBM—3007739
DE83007749	CONF-830423—1
DE83007751	CONF-8104192—3
DE83007752	CONF-8104192—2
DE83007754	CONF-810497—4
DE83007760	DOE/EIA—0075(82/09)
DE83007764	CONF-810497—5
DE83007770	MHSMP—83-10
DE83007774	CONF-811150—17
DE83007775	CONF-820420—12
DE83007783	DOE/EI/11865—T1-Vol.3-App.E
DE83007787	CONF-820909—19
DE83007792	CONF-810203—18
DE83007793	CONF-811150—16
DE83007794	CONF-811150—15
DE83007795	CONF-810432—5
DE83007796	CONF-811145—18
DE83007804	CONF-810809—30
DE83007806	CONF-820422—4
DE83007820	CONF-820434—17
DE83007823	CONF-820441—6
DE83007835	CONF-810842—9
DE83007836	PNL-SA—10832
DE83007837	PNL-SA—11174
DE83007838	PNL-SA—10964
DE83007855	CONF-811150—13
DE83007859	PNL-SA—10800
DE83007860	CONF-811276—1
DE83007865	CONF-8208116—1
DE83007875	PNL-SA—11163
DE83007876	PNL-SA—10829
DE83007886	DP-tr—37
DE83007887	DOE/LC/10787—111
DE83007888	CONF-810860—12
DE83007889	CONF-810736—3
DE83007907	CONF-810740—3
DE83007908	CONF-810812—48
DE83007929	DOE/FE/60138—T2
DE83007930	CONF-810756—4

Order No.	Report No.
DE83007931	CONF-810868—6
DE83007940	SAND—83-0474c
DE83007942	CONF-810831—103
DE83007944	DOE/EI/11865—T1-Vol.2-A-D
DE83007946	CONF-811103—128
DE83007948	DOE/EI/11865—T1-Vol.5
DE83007956	CONF-821155—7
DE83007960	DOE/NBM—3007960
DE83007963	CONF-820773—1
DE83007969	CONF-820434—18
DE83007970	PPPL—1985
DE83007971	DOE/ER/10477—3
DE83007990	SAND—82-2681
DE83007991	DOE/RL—83-1
DE83008004	DOE/EIA—0226(82/07)
DE83008014	DOE/EIA—0035(82/04)
DE83008015	DOE/EIA—0075(82/05)
DE83008016	DOE/EIA—0075(82/04)
DE83008041	DOE/EIA—0040(82)
DE83008047	DOE/EIA—0226(82/02)
DE83008051	DOE/EIA—0226(82/05)
DE83008052	DOE/EIA—0226(82/04)
DE83008058	DOE/EIA—0226(82/06)
DE83008069	DOE/EIA—0202(82/2Q)-2
DE83008070	DOE/EIA—0075(82/01)
DE83008075	DLCS—5000482
DE83008110	DOE/SF/11510—T1
DE83008114	DOE/CS/30254—5
DE83008125	DOE/EP—0043/1
DE83008135	CONF-8210130—Summ.
DE83008143	TID—7029
DE83008161	RAND/N—1709-DOE
DE83008166	SAND—82-2227-Vol.7-No.1
DE83008176	DOE/NASA/10350—35
DE83008177	UCID—19677
DE83008184	NUREG/CR—2925
DE83008189	CONF-821143—6
DE83008190	CONF-821143—5
DE83008191	ORAU/IEA—83-2(M)
DE83008216	CONF-7911188—1
DE83008218	DOE/NBM—3008218
DE83008220	DOE/NBM—3008220
DE83008221	CONF-810319—4
DE83008224	CONF-810814—13
DE83008227	DOE/NBM—3008227
DE83008230	DOE/NBM—3008230
DE83008232	DOE/ER/03238—T1
DE83008233	DOE/NBM—3008233
DE83008235	DOE/ET/14759—T14
DE83008236	DOE/ET/12103—T5
DE83008237	DOE/MC/14129—1375
DE83008238	PNL-SA—10777
DE83008242	PNL-SA—11179
DE83008251	NUREG/CR—1894
DE83008256	DOE/RL/01830—T9
DE83008272	LA—9633-MS
DE83008273	LA—9661-MS
DE83008274	LA—9610-MS
DE83008275	LA—9511-C
DE83008282	LA—9650-MS
DE83008283	LALP—83-4
DE83008328	RHO-BW-SA—219-P
DE83008329	DOE/EV/01300—T1
DE83008352	DOE/EV/02828—T1
DE83008355	DOE/NBM—1059
DE83008356	LA—9673-PR
DE83008358	LA—9636-MS
DE83008361	LA—9537-MS
DE83008371	DOE/EV/03292—3
DE83008378	NUREG/CR—1391
DE83008383	DOE/ER/71015—T1
DE83008386	DOE/CE/40583—T1
DE83008387	DOE/ER/12015—4
DE83008388	DOE/EV/02423—T1
DE83008395	LBL—15485
DE83008397	LBL—13588
DE83008398	LBL—15052
DE83008402	HEDL-SA—2700
DE83008404	HEDL-SA—2687-FP
DE83008405	UCRL—88781
DE83008406	UCRL—88780
DE83008407	UCRL—88782
DE83008408	UCID—19663
DE83008409	EGG-FM—5487
DE83008414	SAND—82-8894
DE83008415	CONF-790615—30
DE83008418	CONF-7804203—1
DE83008419	UCID—19305
DE83008420	CONF-820551—2
DE83008424	SAND—82-2469
DE83008425	DOE/NBM—3008425
DE83008426	PNL—4527
DE83008430	CONF-781110—18
DE83008431	CONF-8205167—1
DE83008432	DOE/ET/34026—6
DE83008433	DOE/NBM—3008433
DE83008434	CONF-780611—17
DE83008435	DOE/NBM—3008435
DE83008436	DOE/NBM—3008436
DE83008437	CONF-8103159—1
DE83008438	PNL-SA—11151
DE83008439	UCRL—53311
DE83008440	UCID—19735
DE83008441	CONF-811132—2
DE83008442	UCID—19727
DE83008444	DOE/NBM—3008444
DE83008445	CONF-811242—2
DE83008446	DOE/NBM—3008446
DE83008447	DOE/NBM—3008447
DE83008454	SAND—82-2975C
DE83008457	GA-A—16845
DE83008458	DOE/CS/64007—T4
DE83008459	NUREG/CR—3167
DE83008460	DOE/ET/14054—4
DE83008463	CONF-820704—43
DE83008464	CONF-820704—42
DE83008465	CONF-820704—41
DE83008466	CONF-820704—38
DE83008467	CONF-820704—37
DE83008468	SERI/TP—254-1801
DE83008469	BNL—51634
DE83008474	BNL—51612
DE83008476	DOE/NE—0049
DE83008477	ONWI—9(82-2)
DE83008478	SERI/TR—215-1598
DE83008482	DOE/RA/50377—2
DE83008488	DOE/BETC/RI—83/3
DE83008495	DOE/CS/64007—T2
DE83008498	DOE/LC/10910—T1
DE83008499	GA-A—16853
DE83008500	CONF-820717—6
DE83008501	CONF-810566—12
DE83008503	CONF-820627—15
DE83008504	CONF-820738—6
DE83008505	CONF-810905—41
DE83008506	CONF-8205170—1
DE83008507	CONF-810809—32
DE83008509	CONF-811040—200
DE83008510	CONF-810625—23
DE83008511	CONF-810402—14
DE83008512	CONF-810545—7
DE83008513	CONF-810574—3
DE83008514	CONF-810545—8
DE83008515	CONF-810574—2
DE83008516	CONF-810546—5
DE83008522	CONF-810545—9
DE83008524	CONF-820864—4
DE83008525	CONF-810107—7
DE83008526	CONF-8103162—1
DE83008527	CONF-810809—31
DE83008528	CONF-820406—27
DE83008529	CONF-820428—11
DE83008530	CONF-820704—39
DE83008531	CONF-820704—40
DE83008532	CONF-821106—29
DE83008534	CONF-820911—4
DE83008536	CONF-800879—2
DE83008537	CONF-811040—198
DE83008538	DOE/EV/10731—T1
DE83008539	CONF-8010322—1
DE83008550	CONF-820717—7
DE83008551	CONF-820717—8
DE83008552	CONF-820397—2
DE83008553	DOE/SR/11018—T1
DE83008554	ORNL/Sub—79/21453/13
DE83008555	DOE/ER/00854—39
DE83008556	PNL—4637
DE83008559	DOE/RA/50362—1395-Vol.7-App.
DE83008560	DOE/RA/50362—1395-Vol.8
DE83008565	DOE/RA/50362—1395-Vol.2-Pt.1
DE83008566	DOE/RA/50362—1395-Vol.2-Pt.2
DE83008567	DOE/RA/50362—1395-Vol.3
DE83008569	DOE/RA/50362—1395-Vol.5
DE83008570	DOE/RA/50362—1395-Vol.6
DE83008571	DOE/RA/50362—1395-Vol.7-Pt.1
DE83008572	DOE/RA/50362—1395-Vol.7-Pt.2
DE83008573	DOE/FC—1006
DE83008574	DOE/CS/64007—T3
DE83008575	DOE/ET/34212—36
DE83008579	ORNL-tr—4968
DE83008581	BNL—32603
DE83008583	BNL—32589
DE83008584	BNL—32590
DE83008585	BNL—32591
DE83008589	BNL—31913
DE83008593	UCRL—88562
DE83008600	CONF-810523—19
DE83008601	CONF-810545—10
DE83008602	CONF-810581—3
DE83008604	CONF-820907—4
DE83008605	CONF-8209104—2
DE83008606	CONF-820929—12
DE83008608	CONF-811012—67
DE83008609	CONF-820929—13
DE83008610	ONWI—266
DE83008614	CONF-810106—7
DE83008615	CONF-810106—8
DE83008616	CONF-810153—4
DE83008618	CONF-820101—6
DE83008619	CONF-810233—2
DE83008620	CONF-810106—6
DE83008621	CONF-821211—6
DE83008622	CONF-820203—6
DE83008623	CONF-820659—9
DE83008624	CONF-820604—14
DE83008625	CONF-8204119—1
DE83008626	CONF-810507—2
DE83008627	CONF-810488—7
DE83008628	CONF-8104153—4
DE83008629	CONF-8103163—2
DE83008630	CONF-820901—9
DE83008631	DOE/ER/10394—2
DE83008633	ANL/EES-TM—209
DE83008634	ANL/CNSV-TM—108
DE83008635	ANL/CNSV-TM—109
DE83008636	ANL/EES-TM—207-Vol.1
DE83008637	ANL/CNSV-TM—107
DE83008638	ANL/CNSV-TM—111
DE83008639	ANL/EES-TM—211
DE83008640	ANL/EES-TM—208
DE83008641	ANL/EES-TM—210
DE83008642	CONF-821015—6
DE83008643	CONF-8205169—1
DE83008644	CONF-820814—38
DE83008645	CONF-821123—38
DE83008646	CONF-810296—1
DE83008647	CONF-810106—5
DE83008648	CONF-820883—3
DE83008649	CONF-820717—5
DE83008650	LBL—14251
DE83008652	CONF-8104197—1
DE83008653	CONF-8104198—1
DE83008654	DOE/EI/10696—1-Vol.3-Pt.2
DE83008655	CONF-8106164—5
DE83008658	CONF-820776—1
DE83008659	CONF-820303—44
DE83008661	CONF-820309—6
DE83008662	CONF-8203121—1
DE83008664	CONF-820357—8
DE83008665	CONF-820814—42
DE83008666	DOE/EV/02965—2
DE83008667	CONF-820814—44
DE83008668	CONF-820814—43
DE83008669	CONF-820814—39
DE83008671	CONF-820814—40
DE83008672	CONF-811051—4
DE83008673	CONF-811040—199
DE83008674	CONF-8110259—1
DE83008675	RFP-Trans—394

Order No.	Report No.
DE83008676	RFP-Trans—379
DE83008677	RFP-Trans—378
DE83008678	RFP-Trans—382
DE83008679	RFP-Trans—383
DE83008680	RFP-Trans—391
DE83008682	CONF-820810—17
DE83008683	CONF-820810—18
DE83008684	CONF-820899—3
DE83008685	NUREG/CR—3135
DE83008687	CONF-820839—7
DE83008689	CONF-821015—8
DE83008690	CONF-821015—7
DE83008691	CONF-821015—9
DE83008692	CONF-821066—3
DE83008694	CONF-821049—18
DE83008698	CONF-8110242—3
DE83008699	CONF-8110112—2
DE83008700	DOE/ET/21002—T25
DE83008701	DOE/EI/10696—1-Vol.2
DE83008710	CONF-820655—13
DE83008711	DOE/EI/10696—1-Vol.1
DE83008712	DOE/ER/10959—2
DE83008714	ANL-K—83-12-Pt.2
DE83008715	ANL-K—83-12-Pt.1
DE83008716	DOE/NBM—3008716
DE83008717	ANL/CNSV—36
DE83008719	PNL—4625
DE83008720	DOE/ET/20279—236
DE83008721	PNL—4423
DE83008722	DOE/NBB—0022
DE83008723	SAND—82-8057
DE83008724	UCRL—53383
DE83008725	ANL/FE—82-4
DE83008726	ANL-CT—80-3-Add.3
DE83008727	ANL/SPG—22
DE83008728	DOE/TIC—3008728
DE83008731	NUREG/CR—2728
DE83008733	NUREG/CR—2531-Rev.1
DE83008734	NUREG/CR—3074
DE83008737	UCID—19638
DE83008739	LA—9427-Vol.1
DE83008740	CONF-810109—2
DE83008741	CONF-810109—3
DE83008742	CONF-810109—4
DE83008744	CONF-810545—11
DE83008746	CONF-820601—27
DE83008747	DOE/ER/04178—6
DE83008748	CONF-820609—81
DE83008755	PNL—3172
DE83008756	PNL—4318
DE83008757	DOE/ER/05002—32
DE83008758	CONF-821008—3
DE83008759	DOE/CE—0028/1
DE83008760	ALO—5365-4
DE83008763	DOE/ER/10915—2
DE83008764	DOE/NV/10249—T1
DE83008765	NUREG/CR—2744/1
DE83008766	NUREG/CR—2771
DE83008770	DOE/CS/64007—T1
DE83008772	DOE/ID/12348—T4
DE83008773	DOE/NBM—3008773
DE83008774	DOE/MC/08216—T3
DE83008777	DOE/EV/04703—37
DE83008778	DOE/EV/04703—40
DE83008779	DOE/EV/04703—39
DE83008780	DOE/EV/04703—38
DE83008784	DOE/EIA—0118(81)
DE83008785	DOE/EIA—0109(83/01)
DE83008786	DOE/EIA—0372/3
DE83008789	DOE/EIA—0226(82/11)
DE83008790	DOE/EIA—0226(82/10)
DE83008791	DOE/EIA—0342(82)
DE83008792	ORNL—5944
DE83008793	MLM—3047
DE83008800	DOE/ER/10407—3
DE83008801	DOE/EIA—0121(82/3Q)
DE83008802	DOE/EIA—0035(83/01)
DE83008803	DOE/EIA—0130(83/01)
DE83008804	DOE/EIA—0035(83/02)
DE83008806	DOE/EIA—0365
DE83008807	DOE/EIA—0363
DE83008808	DOE/EIA—0360(81)
DE83008809	DOE/EIA—0185(82)
DE83008810	DOE/EIA—0202(82/4Q)-2
DE83008812	DOE/EIA—035612
DE83008813	DOE/EIA—0167(81)
DE83008816	DOE/EIA—0109(83/02)
DE83008818	DOE/EIA—0249(83/1)
DE83008823	DOE/EIA—0075(82/10)
DE83008824	SOLAR/2048—79/14
DE83008825	SOLAR/2036—79/14
DE83008826	SOLAR/2003—79/14
DE83008827	SOLAR/1051—79/14
DE83008828	SOLAR/1046—79/14
DE83008829	SOLAR/1043—79/14
DE83008830	SOLAR/0025—79/42
DE83008831	SOLAR/0010—79/06
DE83008832	SOLAR/0010—79/08
DE83008833	SOLAR/0010—79/11
DE83008834	SOLAR/0017—79/34
DE83008835	SOLAR/2011—79/14
DE83008836	SOLAR/2041—79/60
DE83008837	SOLAR/1013—79/14
DE83008838	SOLAR/1015—79/14
DE83008839	SOLAR/1034—79/14
DE83008840	SOLAR/1045—79/14
DE83008841	SOLAR/1087—79/14
DE83008842	SOLAR/2041—79/14
DE83008843	SOLAR/2021—79/14
DE83008844	SOLAR/2014—79/14
DE83008845	SOLAR/2018—79/14
DE83008846	SOLAR/2009—79/14
DE83008847	SOLAR/0010—79/10
DE83008848	SOLAR/0023—79/40
DE83008849	SOLAR/1002—79/14
DE83008871	DOE/JPL/955843—83/8
DE83008918	ANL—83-14
DE83008919	ANL/FPP—82-1
DE83008921	DOE/NBM—3008921
DE83008922	DOE/NBM—3008922
DE83008923	DOE/NBM—3008923
DE83008924	DOE/ET/10136—T1
DE83008927	DOE/MC/08216—T5
DE83008950	DOE/RG/10268—T3
DE83008952	DOE/EIA—0349/1
DE83008953	DOE/NBM—3008953
DE83008954	DOE/TIC—3008954
DE83008961	DOE/ER/10907—2
DE83008963	DOE/EV/05572—4
DE83008965	DOE/MC/12159—1344
DE83008971	HEDL-SA—2854
DE83008972	PPPL—1986
DE83008976	SAND—79-2291
DE83008977	SAND—82-2699
DE83008978	PPPL—1983
DE83008979	PPPL—1982
DE83008980	PPPL—1980
DE83008981	PPPL—1977
DE83008982	PPPL—1989
DE83008983	ABCC-TR—33-71
DE83008984	DOE/OR/00099—T1
DE83008985	MPL-U—34/78
DE83008986	DOE/ER/10421—4
DE83008988	DOE/EI/10565—T1
DE83008989	DOE/EI/10568—T1
DE83008990	DOE/ID/01821—T1
DE83008991	DOE/EV/10467—T1
DE83008992	DOE/OR/04940—3
DE83008993	RHO-BW-ST—46P
DE83008994	NUREG/CR—3063
DE83008995	DOE/JPL/955902—82/7
DE83008998	DOE/JPL/955909—83/9
DE83008999	DOE/ER/04972—4
DE83009059	LBL—14748
DE83009061	USGS-OFR—81-181
DE83009062	PNL—4390
DE83009063	DOE/S—0017
DE83009074	GA-A—16356
DE83009090	DOE/MC/08216—T4
DE83009091	DOE/MC/08216—1257
DE83009093	DOE/ER/10677—5
DE83009096	DOE/ET/28365—24
DE83009097	DOE/ET/28365—26
DE83009100	UCRL—53369-Vol.1
DE83009103	DOE/RG/10268—T4
DE83009111	UCID—19701
DE83009112	SAI—254-83-386-LJ
DE83009113	UCID—19748
DE83009114	PNL—4460
DE83009116	DOE/ET/44802—T5
DE83009117	UCRL—88222
DE83009119	DOE/ER/10645—10-Pt.2
DE83009129	DOE/TIC—3339-Suppl.3
DE83009130	DOE/TIC—11476
DE83009131	DOE-tr—109
DE83009132	LBL—15546
DE83009146	SAND—82-0852
DE83009147	EGG—2236
DE83009148	BDX—613-2912
DE83009149	BDX—613-2829
DE83009150	LBL—11499
DE83009152	PPPL—1772
DE83009153	PNL—3000-8
DE83009154	DOE/TIC—3382-R1
DE83009155	DOE/TIC—11483
DE83009156	DOE/ER/03069—T3
DE83009157	DOE/ET/10069—T6
DE83009158	DOE/ET/03425—19
DE83009159	DOE/RS/10145—T1
DE83009162	DOE/ET/53088—84
DE83009163	SAND—83-0649C
DE83009165	SAND—82-2453C
DE83009166	NBL—308
DE83009168	DOE/BC/10215—23
DE83009169	DOE/CS/20156—T2
DE83009170	DOE/EP—0040/1
DE83009171	UCRL—53150
DE83009172	UCID—19473
DE83009173	UCID—19740
DE83009174	UCID—19741
DE83009176	SAND—81-7088/15
DE83009177	SAND—81-7088/14
DE83009178	SAND—81-7088/16
DE83009179	SAND—82-1821
DE83009180	UCID—19702
DE83009181	UCRL—53393
DE83009182	SERI/TP—254-1802
DE83009183	DOE/CS/20451—T1
DE83009185	SAND—83-0628C
DE83009189	DOE/ER/10731—2
DE83009191	EGG-FM—6187
DE83009193	SAND—83-0514C
DE83009195	DOE/CE/40551—T1
DE83009196	EGG-TMI—6198
DE83009197	EGG-FM—5667
DE83009198	DOE/ID/12225—T2
DE83009199	EGG-TMI—6181
DE83009200	EGG-TMI—5966-Rev.1
DE83009201	EGG-FM—6153
DE83009202	EGG-GTH—6143
DE83009203	DOE/TIC—11478
DE83009204	DOE/TIC—11480
DE83009210	UCRL—53369-Vol.2
DE83009211	UCRL—53344-Vol.4
DE83009212	UCRL—53377
DE83009213	UCRL—52000-83-1
DE83009215	DOE/NBB—0027
DE83009216	SAND—82-2495
DE83009217	UCID—19700
DE83009218	UCID—19474
DE83009219	UCID—19475
DE83009220	SAND—82-0695
DE83009221	SAND—82-2373
DE83009222	DOE/METC/SP—194
DE83009223	GEND—031
DE83009224	ONWI—424
DE83009226	DOE/PC/40089—T2
DE83009236	MDC-H—0141
DE83009237	DOE/ER/10640—3
DE83009238	UCRL—88283
DE83009241	UCRL—88867
DE83009242	UCRL—88904
DE83009243	UCRL—88167
DE83009245	UCRL—88908
DE83009247	UCRL—88812
DE83009248	DOE/ER/04461—3
DE83009249	DOE/ET/10815—58
DE83009250	DOE/PETC/TR—83/1
DE83009251	EPRI-NP—2745
DE83009252	EPRI-AP—2846
DE83009255	EPRI-EA—2867
DE83009258	DOE/ET/23119—T1
DE83009260	DOE/JPL/955282—80/7
DE83009265	USGS-OFR—80-938
DE83009270	DOE/ET/20216—T2

Order No.	Report No.
DE83009271	LA—9671-HDR
DE83009273	LA—9620
DE83009274	LA—9679-PR
DE83009275	LA—9665-MS
DE83009277	LA—9324-MS
DE83009278	DOE/ER/10613—2
DE83009279	DOE/MA—0006/8
DE83009281	K/OA—5424
DE83009282	ALO—1983
DE83009287	DOE/MC/14060—T1
DE83009304	DOE/EIA—0075(82/11)
DE83009311	DOE/DP/40162—1
DE83009312	DOE/PC/40265—6
DE83009322	UCRL—15521-Vol.2
DE83009323	DOE/EIA—0226(82/12)
DE83009324	UCRL—15521-Vol.1
DE83009327	NUREG/CR—2716-Vol.3
DE83009328	UCRL—15520
DE83009331	RFP-Trans—393
DE83009337	NUREG/CR—2901
DE83009345	IS—4766
DE83009348	PNL—4436
DE83009349	DOE/CS/20101—1
DE83009352	MLM—3039
DE83009353	DOE/RA/12117—3
DE83009354	GEND—030-Vol.1
DE83009355	DOE/ET/53051—49
DE83009356	UCID—19681
DE83009358	SAND—83-8209
DE83009359	SAND—83-8202
DE83009369	NUREG/CR—2887
DE83009370	DOE/CS/40312—2
DE83009371	DOE/ER/02640—14
DE83009373	LA—9617-MS
DE83009374	DOE/EIA—0328
DE83009375	NUREG/CR—3030
DE83009378	DOE/ER/10921—T1
DE83009379	DOE/ET/29071—T4
DE83009384	SAND—83-0132
DE83009386	DP—1639
DE83009387	SAND—83-0083
DE83009389	SAND—82-7211
DE83009390	SAND—83-0041
DE83009391	SAND—81-1295
DE83009392	DOE/ET/34203—47
DE83009393	SAND—82-7203
DE83009409	DOE/CS/32393—T1
DE83009411	DOE-tr—22
DE83009412	DOE/TIC—11428
DE83009413	DP-MS—80-115
DE83009468	ANL/FPP/TM—166
DE83009470	PNL—4639
DE83009472	DOE/BC/10498—5
DE83009473	SAND—83-0287
DE83009474	PNL—4396
DE83009477	ANL/FPP/TM—168
DE83009478	ANL/FPP/TM—162
DE83009584	DOE/RA/10722—3
DE83009715	SERI/STR—211-1827
DE83009718	DOE/ET/34010—8
DE83009719	HEDL-TME—82-28
DE83009723	DOE/ET/34010—7
DE83009821	HEDL-TME—73-51
DE83009822	LA-tr—81-4
DE83009823	LA-tr—81-5
DE83048749	ANL/NESC—749
DE83048750	ANL/NESC—750R
DE83048751	ANL/NESC—751R
DE83048753	ANL/NESC—753
DE83048754	ANL/NESC—754
DE83048755	ANL/NESC—755
DE83048756	ANL/NESC—756
DE83048757	ANL/NESC—757
DE83048758	ANL/NESC—758
DE83048759	ANL/NESC—759
DE83048760	ANL/NESC—760
DE83048761	ANL/NESC—761R
DE83048762	ANL/NESC—762R
DE83048763	ANL/NESC—763
DE83048764	ANL/NESC—764
DE83048765	ANL/NESC—765
DE83048766	ANL/NESC—766
DE83048767	ANL/NESC—767
DE83048768	ANL/NESC—768
DE83048769	ANL/NESC—769
DE83048770	ANL/NESC—770
DE83048771	ANL/NESC—771
DE83048773	ANL/NESC—773
DE83048774	ANL/NESC—774
DE83048775	ANL/NESC—775
DE83048776	ANL/NESC—776
DE83048777	ANL/NESC—777
DE83048778	ANL/NESC—778
DE83048779	ANL/NESC—779
DE83048780	ANL/NESC—780
DE83048781	ANL/NESC—781
DE83048782	ANL/NESC—782
DE83048783	ANL/NESC—783
DE83048784	ANL/NESC—784
DE83048785	ANL/NESC—785
DE83048786	ANL/NESC—786
DE83048787	ANL/NESC—787
DE83048788	ANL/NESC—788
DE83048789	ANL/NESC—789
DE83048790	ANL/NESC—790
DE83048791	ANL/NESC—791
DE83048792	ANL/NESC—792
DE83048793	ANL/NESC—793
DE83048794	ANL/NESC—794
DE83048795	ANL/NESC—795
DE83048797	ANL/NESC—797
DE83048798	ANL/NESC—798
DE83048799	ANL/NESC—799
DE83048800	ANL/NESC—800
DE83048801	ANL/NESC—801
DE83048802	ANL/NESC—802
DE83048803	ANL/NESC—803
DE83048804	ANL/NESC—804
DE83048805	ANL/NESC—805
DE83048806	ANL/NESC—806
DE83048807	ANL/NESC—807
DE83048808	ANL/NESC—808
DE83048809	ANL/NESC—809
DE83048810	ANL/NESC—810R
DE83048811	ANL/NESC—811
DE83048812	ANL/NESC—812
DE83048813	ANL/NESC—813
DE83048814	ANL/NESC—814
DE83048815	ANL/NESC—815
DE83048816	ANL/NESC—816
DE83048817	ANL/NESC—817
DE83048818	ANL/NESC—818
DE83048819	ANL/NESC—819
DE83048820	ANL/NESC—820
DE83048821	ANL/NESC—821
DE83048822	ANL/NESC—822
DE83048823	ANL/NESC—823R
DE83048824	ANL/NESC—824
DE83048825	ANL/NESC—825
DE83048826	ANL/NESC—826R
DE83048827	ANL/NESC—827
DE83048828	ANL/NESC—828
DE83048829	ANL/NESC—829
DE83048830	ANL/NESC—830
DE83048831	ANL/NESC—831
DE83048832	ANL/NESC—832
DE83048833	ANL/NESC—833
DE83048834	ANL/NESC—834
DE83048835	ANL/NESC—835
DE83048836	ANL/NESC—836
DE83048837	ANL/NESC—837
DE83048838	ANL/NESC—838
DE83048840	ANL/NESC—840
DE83048841	ANL/NESC—841
DE83048842	ANL/NESC—842
DE83048843	ANL/NESC—843
DE83048844	ANL/NESC—844
DE83048845	ANL/NESC—845
DE83048846	ANL/NESC—846
DE83048847	ANL/NESC—847
DE83048848	ANL/NESC—848
DE83048949	ANL/NESC—949
DE83048950	ANL/NESC—950
DE83048951	ANL/NESC—951
DE83048952	ANL/NESC—952
DE83048953	ANL/NESC—953
DE83048954	ANL/NESC—954
DE83048955	ANL/NESC—955
DE83048956	ANL/NESC—956R
DE83048957	ANL/NESC—957
DE83048958	ANL/NESC—958
DE83048959	ANL/NESC—959
DE83048960	ANL/NESC—960
DE83048961	ANL/NESC—961
DE83048963	ANL/NESC—963
DE83048964	ANL/NESC—964
DE83048965	ANL/NESC—965
DE83048966	ANL/NESC—966
DE83048967	ANL/NESC—967
DE83048968	ANL/NESC—968
DE83048969	ANL/NESC—969
DE83048970	ANL/NESC—970
DE83048971	ANL/NESC—971
DE83048972	ANL/NESC—972
DE83048973	ANL/NESC—973
DE83048974	ANL/NESC—974
DE83048975	ANL/NESC—975
DE83048976	ANL/NESC—976
DE83048977	ANL/NESC—977
DE83048978	ANL/NESC—978
DE83048979	ANL/NESC—979R
DE83048980	ANL/NESC—980
DE83048981	ANL/NESC—981
DE83048982	ANL/NESC—982
DE83048983	ANL/NESC—983
DE83048984	ANL/NESC—984
DE83048985	ANL/NESC—985
DE83048986	ANL/NESC—986
DE83048987	ANL/NESC—987
DE83048988	ANL/NESC—988
DE83048989	ANL/NESC—989
DE83048990	ANL/NESC—990
DE83048991	ANL/NESC—991
DE83048992	ANL/NESC—992
DE83048995	ANL/NESC—995
DE83700729	IPPJ—529
DE83700730	Rijnhuizen—82-140
DE83700731	Rijnhuizen—82-142
DE83700732	IC—80/100
DE83700733	IC—80/130
DE83700734	IC—80/98
DE83750127	IKE—6-138
DE83750129	Juel-Spez—152
DE83750130	KFK—3250
DE83750131	IKE-K—71
DE83750132	GSI—82-4
DE83750133	KFK—3354
DE83750134	KFK—3387
DE83750135	KFK—3338
DE83750136	BONN-HE—82-14
DE83750137	BONN-HE—82-16
DE83750138	BONN-HE—82-13
DE83750139	BONN-HE—82-17
DE83750140	BONN-HE—82-15
DE83750141	KFK—3360
DE83750142	Juel—1774
DE83750145	KFK—3331
DE83750146	Juel—1783
DE83750304	KFK—3402
DE83750305	GSF-R—289
DE83750306	GSF-T—137
DE83750307	GSF-S—859
DE83750315	BMFT-FB-T—79-78
DE83750316	BMFT-FB-T—79-91
DE83750317	BMFT-FB-T—79-90
DE83750318	BMFT-FB-T—79-102
DE83750319	BMFT-FB-T—79-94
DE83750320	BMFT-FB-T—79-85
DE83750321	BMFT-FB-T—79-95
DE83750322	BMFT-FB-T—79-98
DE83750323	BMFT-FB-T—79-96
DE83750324	BMFT-FB-T—79-97
DE83750325	BMFT-FB-T—79-92
DE83750326	BMFT-FB-T—79-101
DE83750327	BMFT-FB-T—79-93
DE83750328	BMFT-FB-T—79-89
DE83750329	BMFT-FB-T—79-99
DE83750330	BMFT-FB-T—79-100
DE83750331	BMFT-FB-T—79-109
DE83750332	BMFT-FB-T—79-118
DE83750333	BMFT-FB-T—79-106
DE83750334	BMFT-FB-T—79-135
DE83750335	BMFT-FB-T—79-139
DE83750336	BMFT-FB-T—79-140
DE83750337	BMFT-FB-T—79-142

Order No.	Report No.
DE83750338	BMFT-FB-T—79-103
DE83750339	BMFT-FB-T—79-115
DE83750340	BMFT-FB-HA—79-22
DE83750341	BMFT-FB-HA—79-20
DE83750342	BMFT-FB-HA—79-19
DE83750343	BMFT-FB-M—79-06
DE83750344	BMFT-FB-T—80-048
DE83750345	BMFT-FB-T—80-051
DE83750346	BMFT-FB-T—80-049
DE83750347	BMFT-FB-T—80-101
DE83750348	BMFT-FB-T—80-072
DE83750349	BMFT-FB-HA—80-041
DE83750350	BMFT-FB-HA—80-036
DE83750351	BMFT-FB-HA—80-033
DE83750352	BMFT-FB-T—80-067
DE83750353	BMFT-FB-T—80-070
DE83750354	BMFT-FB-T—80-075
DE83750355	BMFT-FB-T—80-052
DE83750356	BMFT-FB-T—80-055
DE83750357	BMFT-FB-T—80-056
DE83750358	BMFT-FB-T—80-057
DE83750359	BMFT-FB-T—80-058
DE83750360	BMFT-FB-T—80-059
DE83750361	BMFT-FB-T—80-119
DE83750362	BMFT-FB-T—80-115
DE83750363	BMFT-FB-T—80-112
DE83750364	BMFT-FB-T—80-114
DE83750365	BMFT-FB-T—80-121
DE83750366	BMFT-FB-DV—80-007
DE83750367	BMFT-FB-T—80-124
DE83750368	BMFT-FB-T—80-123
DE83750369	BMFT-FB-T—80-122
DE83750570	Juel-Spez—65
DE83750371	BMFT-FB-T—80-143
DE83750372	BMFT-FB-T—80-128
DE83750373	BMFT-FB-T—80-125
DE83750374	GKSS—80/E/17
DE83750375	Juel-Spez—70(Vol.1)
DE83750397	DFVLR-FB—82-27
DE83750419	EDF-CG-RA—1981
DE83770029	NP—3770029
DE83770030	NP—3770030
DE83770031	NP—3770031
DE83770032	NP—3770032
DE83770033	NP—3770033
DE83770034	NP—3770034
DE83770035	NP—3770035
DE83770036	NP—3770036
DE83770037	NP—3770037
DE83770038	NP—3770038
DE83770039	NP—3770039
DE83770040	CEA-CONF—6419
DE83770041	CEA-CONF—6425
DE83770042	CEA-CONF—6298
DE83780416	HMI—373
DE83900756	EPRI-CS—2723
DE83900859	CNEN-RT/AMB—82-3
DE83900868	CNEN-RT/AMB—82-1
DE83900927	REG/G—3.46
DE83901012	CONF-8103155—
DE83901398	NUREG—0896
DE83901399	NUREG—0304-Vol.7-No.4
DE83901400	NUREG/CR—3145-Vol.1
DE83901401	NUREG—0964
DE83901403	NUREG/CR—3144
DE83901460	EPRI-EA—2827
DE83901475	EEC—134
DE83901511	NUREG—0580-Vol.12-No.2
DE83901512	NUREG/CR—3130
DE83901515	NUREG/BR—0025-Vol.9-No.2
DE83901525	NUREG—0797-Suppl.3
DE83901526	NUREG—0907
DE83901527	NUREG—0857-Suppl.4
DE83901531	CONF-821101—19
DE83901552	NUREG—0020-Vol.6-No.11
DE83901665	NUREG—0525-Rev.6
DE83901669	NP—3901669
DE83901670	NP—3901670
DE83901672	NP—3901672
DE83901677	TVA/ONR/LFR—83/7
DE83901678	TVA/ONR/LFR—83/5
DE83901679	TVA/ONR/LFR—82/8
DE83901682	TVA/OP/OPS—83/1
DE83901683	TVA/OP/EDT—83/3
DE83901684	CONF-830218—1
DE83901685	TVA/OP/ECR—82/42
DE83901687	TVA/OP/EUDR—83/3
DE83901688	NUREG—0422-Suppl.6
DE83901816	NUREG—0540-Vol.4-No.12
DE83901818	NUREG/CR—2959-813-1165
DE83901819	NUREG—0968-Vol.1
DE83901820	NUREG—0968-Vol.2-App.
DE83901822	EPRI-EM—2886
DE83901823	EPRI-NP—1583
DE83901824	NUREG—0966
DE83901825	EPRI-NP—2903
DE83901826	EPRI-NP—2746
DE83901827	EPRI-EM—2864
DE83901828	EPRI-NP—2856-CCM
DE83901830	EPRI-P—2851-SR
DE83901831	EPRI-EA—2904
DE83901832	EPRI-AP—2883
DE83901833	EPRI-EA—2880-Vol.1
DE83901834	EPRI-NP—2873
DE83901835	EPRI-EA—1914-Vol.2
DE83901837	EPRI-NP—2789-SR
DE83901838	EPRI-EL—2834
DE83901848	NUREG/CR—3212
DE83901849	EPRI-EL—2876
DE83901850	EPRI-EA—2243
DE83901851	EPRI-EA—2895
DE83901852	EPRI-AP—2871-CCM
DE83901856	EPRI-AP—2854
DE83901857	EPRI-NP—2815
DE83901858	EPRI-EL—2870
DE83901859	EPRI-NP—2898
DE83901860	EPRI-NP—2751
DE83901861	EPRI-CS—2885
DE83901863	EPRI-EL—2874
DE83901864	EPRI-AP—2475
DE83901865	EPRI-AP—2882-SY
DE83901866	EPRI-NP—2907-SR
DE83901868	EPRI-NP—2877
DE83901869	EPRI-EA—2889
DE83901870	EPRI-NP—2848
DE83901871	EPRI-NP—2887-Vol.1
DE83901872	EPRI-AP—2882
DE83901873	EPRI-EL—2847
DE83901874	EPRI-NP—2887-Vol.2
DE83901875	EPRI-NP—2872
DE83901877	EPRI-NP—2728-SR
DE83901878	EPRI-NP—2887-Vol.3
DE83901881	NYSERDA—82-33
DE83901882	NUREG—0837-Vol.2-No.3
DE83901883	NUREG—0748-Vol.3-No.2
DE83901891	NUREG/CR—3116
DE83901895	NUREG/CR—3065-813-1163-Vol.2
DE83901896	NUREG/CR—2854-813-1164D
DE83901897	NUREG/CR—3065-813-1163-Vol.1

Abbreviations Used in Availability Column

EM Available in aperture card format only. Inquiries regarding the availability of these items should be addressed to USDOE-TIC, P.O. Box 62, Oak Ridge, Tennessee, 37830.

ETEC Available *only to requesters within the United States* from the Energy Technology Engineering Center, P.O. Box 1449, Canoga Park, California 91304.

GJO Available from DOE Grand Junction Office, P.O. Box 2567, Grand Junction, Colorado 81501.

GPO For sale by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

HMSO Her Majesty's Stationery Office, Atlantic House, Holborn Viaduct, London, England, EC1P 1BN.

NSO Available *only to requesters within the United States* from the Nuclear Standards Office, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tennessee 37830.

NTIS For sale by the National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, Virginia 22161. Price given is the domestic price for paper copy; prices for foreign purchasers are in most instances twice the domestic price.

TIC Available from the Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830.

NTIS NORTH AMERICAN PRICE CODES

Most NTIS products and services are now announced by price codes and, therefore, without specific prices in NTIS journals, newsletters and indexes.

The current dollar equivalent for each code is shown in the schedule below. Orders must list the accession number(s) and be accompanied by the total dollar amount from the current schedule.

NORTH AMERICAN CONTINENT PRICE SCHEDULE

Customers in Canada, United States, and Mexico please use this price schedule; other addressees, write for Folder PR-360-4.

MICROFICHE					
A01	$4.50	E01	$6.50	T01	$125.00
PAPER COPY		E02	7.50	T02	140.00
		E03	9.50	T03	240.00
A02	7.00	E04	11.50	T04	320.00
A03	8.50	E05	13.50	T05	400.00
A04	10.00	E06	15.50	T06	465.00
A05	11.50	E07	17.50	T07	530.00
A06	13.00	E08	19.50	T08	595.00
A07	14.50	E09	21.50	T09	660.00
A08	16.00	E10	23.50	T10	725.00
A09	17.50	E11	25.50	T11	790.00
A10	19.00	E12	28.50	T12	855.00
A11	20.50	E13	31.50	T13	920.00
A12	22.00	E14	34.50	T14	985.00
A13	23.50	E15	37.50	T15	1,050.00
A14	25.00	E16	40.50	T16	1,115.00
A15	26.50	E17	43.50	T17	1,180.00
A16	28.00	E18	46.50	T18	1,245.00
A17	29.50	E19	51.50	T19	1,310.00
A18	31.00	E20	61.50	T99	**
A19	32.50	E99	**		
A20	34.00				
A21	35.50	N01	35.00		
A22	37.00	N02	40.00		
A23	38.50				
A24	40.00	*Add $1.50 for each additional 25-page increment, or portion thereof.			
A25	41.50	**Contact NTIS for price quote.			
A99	*				

PRICES EFFECTIVE JANUARY 1, 1983

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

CODES USED ON INDEX LINES

Following the citation numbers in the Corporate Author, Personal Author, and Subject Indexes, codes are used to designate the type of document, country of publication, and language of the document, e.g., (R:SU:In Russian). The language designator does not appear if the document is published in English.

DOCUMENT TYPES

J	Journal article
TJ	Translation of a journal article
R	Report
RA	Report analytic
B	Book
BA	Book analytic
P	Patent
E	Engineering materials
D	Thesis or dissertation
TG	Translation (general)
TA	Translation (analytic)

COUNTRY CODES

AD	Andorra
AE	United Arab Emirates
AF	Afghanistan
AL	Albania
AR	Argentina
AT	Austria
AU	Australia
BB	Barbados
BD	Bangladesh
BE	Belgium
BG	Bulgaria
BH	Bahrain
BI	Burundi
BM	Bermuda
BO	Bolivia
BR	Brazil
BS	Bahamas
BT	Bhutan
BU	Burma
BW	Botswana
BY	Byelorussian Soviet Socialist Republic (Byelorussian SSR)
CA	Canada
CB	Khmer Republic
CE	Ceylon
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Ivory Coast
CL	Chile
CM	United Republic of Cameroon
CN	China
CO	Columbia
CR	Costa Rica
CS	Czechoslovakia
CU	Cuba
CY	Cyprus
DD	German Democratic Republic
DE	Germany, Federal Republic of (F.R. Germany)
DK	Denmark
DO	Dominican Republic
DY	Dahomey
DZ	Algeria
EA	European American Committee Reactor Physics
EC	Ecuador
ED	European American Nuclear Data Committee
EG	Egypt
ER	European Space Research Organization
ES	Spain
ET	Ethiopia
EU	European Company for the Chemical Processing of Irradiated Fuels
FI	Finland
FJ	Fiji
FR	France
GA	Gabon
GB	United Kingdom of Great Britain and Northern Ireland (UK)
GD	Grenada
GH	Ghana
GM	Gambia
GN	Guinea
GQ	Equatorial Guinea
GR	Greece
GT	Guatemala
GW	Guinea-Bissau
GY	Guyana
HK	Hong Kong
HN	Honduras
HT	Haiti
HU	Hungary
HV	Upper Volta
IA	Inter-American Nuclear Energy Commission
IB	International Bank for Reconstruction and Development
ID	Indonesia
IE	Ireland
IG	Inter-Governmental Maritime Consultative Organization
II	International Commission on Radiation Units and Measurements
IL	Israel

IN India
IO International Labor Organization
IP International Union of Pure and Applied Physics
IQ Iraq
IR Iran
IS Iceland
IT Italy
IX International Union of Pure and Applied Chemistry

JM Jamaica
JO Jordan
JP Japan

KE Kenya
KH Cambodia
KP Democratic People's Republic of Korea
KR Korea, Republic of
KW Kuwait

LA Laos
LB Lebanon
LI Liechtenstein
LK Sri Lanka
LR Liberia
LS Lesotho
LU Luxembourg
LY Libyan Arab Republic

MA Morocco
MC Monaco
MG Madagascar
ML Mali
MN Mongolia
MR Mauritania
MT Malta
MU Mauritius
MV Maldives
MW Malawi
MX Mexico
MY Malaysia

NE Niger
NG Nigeria
NI Nicaragua
NL Netherlands
NO Norway
NP Nepal
NR Nauru
NZ New Zealand

OE Organization for Economic Cooperation and Development
OM Oman

PA Panama
PE Peru
PG Papua New Guinea
PH Philippines
PK Pakistan
PL Poland
PR Puerto Rico
PT Portugal
PY Paraguay

QA Qatar

RH Southern Rhodesia
RO Romania
RW Rwanda

SA Saudi Arabia
SD Sudan
SE Sweden
SG Singapore
SK Sikkim
SL Sierra Leone
SM San Marino
SN Senegal
SO Somalia
SU Union of Soviet Socialist Republics (USSR)
SV El Salvador
SY Syria
SZ Swaziland

TC Trucial Oman
TD Chad
TG Togo
TH Thailand
TN Tunisia
TO Tonga
TR Turkey
TT Trinidad and Tobago
TW Taiwan
TZ United Republic of Tanzania

UA Ukrainian Soviet Socialist Republic (Ukrainian SSR)
UE United Nations Educational, Scientific and Cultural Organization
UF United Nations Children's Fund
UG Uganda
UI United Nations Industrial Development Organization
US United States of America (USA)
UY Uruguay

VA Holy See
VD Democratic Republic of Viet-Nam
VE Venezuela
VS Republic of Viet-Nam

WM World Meteorological Organization
WS Western Samoa

XA International Atomic Energy Agency (IAEA)
XC European Organization for Nuclear Research (CERN)
XE Commission of the European Communities (CEC)
XF Food and Agriculture Organization of the United Nations (FAO)
XJ Joint Institute for Nuclear Research (JINR)
XM Council for Mutual Economic Assistance (CMEA)
XN Nuclear Energy Agency of the OECD (NEA)
XO Organization of African Unity (OAU)
XR International Commission on Radiological Protection (ICRP)
XS International Organization for Standardization (ISO)
XU United Nations (UN)
XW World Health Organization (WHO)
XX World Energy Conference (WEC)

YD Democratic Yemen
YE Yemen
YU Yugoslavia

ZA South Africa
ZM Zambia
ZR Zaire

* U.S. GOVERNMENT PRINTING OFFICE: 1983-646-052:1

Cut out appropriate form and mail in a stamped envelope to the address indicated.

Change of Address Form

NAME—FIRST, LAST

COMPANY NAME OR ADDITIONAL ADDRESS LINE

STREET ADDRESS

CITY | STATE | ZIP CODE

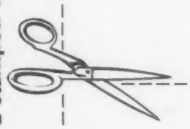
PLEASE PRINT OR TYPE

(or) COUNTRY

Mail this form to:

NEW ADDRESS
Superintendent of Documents
Government Printing Office SSOM
Washington, D.C. 20402

Attach last subscription label here.



Subscription Order Form

SUBSCRIPTION ORDER FORM

ENTER MY SUBSCRIPTION TO:

@ $ **Domestic; @ $** **Foreign.**

NAME—FIRST, LAST

COMPANY NAME OR ADDITIONAL ADDRESS LINE

STREET ADDRESS

CITY | STATE | ZIP CODE

PLEASE PRINT OR TYPE

(or) COUNTRY

☐ Remittance Enclosed (Make checks payable to Superintendent of Documents)

☐ Charge to my Deposit Account No. .....

MAIL ORDER FORM TO:
Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

AVAILABILITY OF REFERENCES ABSTRACTED

REPORTS

Most reports abstracted in this publication may be obtained from

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161

or

DOE Technical Information Center (TIC)
P. O. Box 62
Oak Ridge, TN 37830
ATTN: Customer Services Division

Note: DOE offices and contractors should order from TIC; all others should order from NTIS. For more specific information on ordering, please note the introductory paragraph to the Report Number Index. For assistance in obtaining reports that do not have an Order No. (DE...) or other availability indicated in the citation or Report Number Index, contact TIC.

PATENTS

Although not cataloged as reports, patents cited from each country are listed in the Report Number Index under PATENTS-AU, PATENTS-FR, PATENTS-US, etc. U. S. Patent Applications, e.g., A 293,415, are available from NTIS.

NON-REPORT DOCUMENTS

Check the citation closely for the availability of such documents as journal articles, conference papers, books, and monographs. It may be necessary to request directly from the publisher or originator or to contact local, state, or university libraries or commercial reprint services.

Dissertations are available from University Microfilms International, Dissertation Copies, P. O. Box 1764, Ann Arbor, MI. Please request by Order No., e.g., DA82-11997.

OTHER

When GPO is cited as available source, order from Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

REPORT COLLECTIONS

The libraries listed below purchase and maintain microfiche collections of DOE and foreign reports. Most of these libraries have microfiche reader-printers or other photocopy facilities with which to reproduce enlarged copies from microfiche. Charges for reproduction services vary.

United States

ARIZONA
Tucson, University of Arizona

CALIFORNIA
Davis, University of California
Los Angeles, University of California
Santa Barbara, University of California

COLORADO
Boulder, University of Colorado

DISTRICT OF COLUMBIA
Washington, Library of Congress

FLORIDA
Gainesville, University of Florida

GEORGIA
Atlanta, Georgia Institute of Technology

ILLINOIS
Urbana, University of Illinois

INDIANA
Lafayette, Purdue University

KANSAS
Manhattan, Kansas State University

KENTUCKY
Lexington, University of Kentucky

LOUISIANA
Baton Rouge, Louisiana State University

MARYLAND
College Park, University of Maryland

MASSACHUSETTS
Cambridge, Massachusetts Institute of Technology

MISSISSIPPI
Mississippi State, Mississippi State University

MISSOURI
Columbia, University of Missouri
Kansas City, Linda Hall Library

NEBRASKA
Lincoln, University of Nebraska

NEW JERSEY
Princeton, Princeton University

NEW MEXICO
Albuquerque, University of New Mexico

NEW YORK
Albany, New York State Library
Ithaca, Cornell University
New York, Columbia University
Rochester, University of Rochester

NORTH CAROLINA
Raleigh, North Carolina State University

OHIO
Cincinnati, University of Cincinnati
Cleveland, Cleveland Public Library

OKLAHOMA
Norman, University of Oklahoma

PUERTO RICO
San Juan, University of Puerto Rico

SOUTH CAROLINA
Columbia, University of South Carolina

TEXAS
Austin, University of Texas
College Station, Texas A & M University
Houston, Rice University

UTAH
Salt Lake City, University of Utah

WASHINGTON
Pullman, Washington State University
Seattle, University of Washington

WISCONSIN
Madison, University of Wisconsin

International

EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM)
Brussels, Belgium
Ispra, Varese, Italy, Cetis Library

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)
Vienna, Austria

OECD NUCLEAR ENERGY AGENCY (NEA)
British Library Lending Division
Boston Spa, Wetherby, Yorkshire, England

Corporate Author Index
Personal Author Index
Subject Index
Contract Number Index
Report Number Index
Order Number Correlation

UNITED STATES DEPARTMENT OF ENERGY
P.O. BOX 62
OAK RIDGE, TENNESSEE 37830

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE. $300

POSTAGE AND FEES PAID
UNITED STATES
DEPARTMENT OF ENERGY

3227 . FS- 1
UNIVERSITY MICROFILMS INTERNATIONAL
ATTN SERIALS PROCESSING
300 NORTH ZEEB RD
ANN ARBOR, MI 48106